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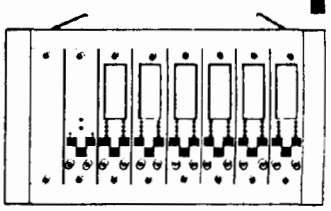
Find the *GE / Bently Nevada 3300/15-03-01-00-00-00-00* at our website: *Click HERE*

DOCUMENT NO. 80177-01

3300/15 DUAL VIBRATION MONITOR

MAINTENANCE MANUAL

BENTLY NEVADA



NOTICE

READ THE FOLLOWING BEFORE INSTALLING OR OPERATING EQUIPMENT.

Bently Nevada Corporation has attempted to identify areas of risk created by improper installation and/or operation of this product. These areas of information are noted as WARNING or CAUTION for your protection and for the safe and effective operation of this equipment. Read all instructions before installing or operating this product. Pay particular attention to those areas designated by the following symbols.

⚠ WARNING

High voltage present could cause shock burns or death

Do not touch exposed wires or terminals

CAUTION

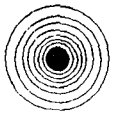
Machine Protection Could Be Discontinued

IN THIS DOCUMENT PROCEDURES ARE GIVEN ONLY FOR ONE CHANNEL. PROCEDURES FOR OTHER CHANNELS ARE SIMILAR EXCEPT FOR THE OBVIOUS SUBSTITUTION OF CORRESPONDING SWITCHES, TERMINALS, AND INDICATORS.

SYMBOLS

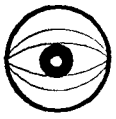
Special symbols are used in the manual to illustrate specifics in the step-by-step process. For example:


PRESS


FLASHING


CONNECT

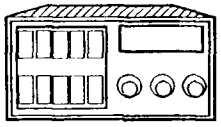

DISCONNECT


OBSERVE


SCREWDRIVER

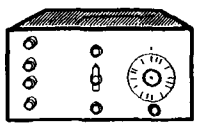
TEST EQUIPMENT (Recommended)

Digital Multimeter



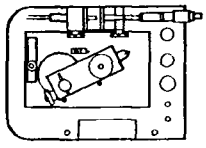
4 1/2 Digit Display
0 to 1000 Vac/Vdc
0 to 10 megohms

Function Generator



Frequency Range
0.1 to 3 MHZ
Offset ±10 Vdc

TK3 Calibration Instrument
Bently Nevada Corporation



TK3-2E (120/220 Vac, 50/60 HZ)
TK3-2G (40 to 90 psi @15 Std cfm max)

FOREWORD

This document is for maintenance personnel who install and maintain the 3300 Monitoring System. The procedures presented should aid service personnel to maintain a Dual Vibration Monitor in a typical 3300 System.

RELATED DOCUMENTS

- 3300 System Overview, 80171
- 3300 System Installation Instructions, 80172
- 3300 System Troubleshooting, 80173
- 3300 Power Supply, 80174
- 3300 System Monitor, 80175
- 3300 Dual Vibration Monitor Operation, 80176-01
- Dynamic Data Manager System, 46390-01

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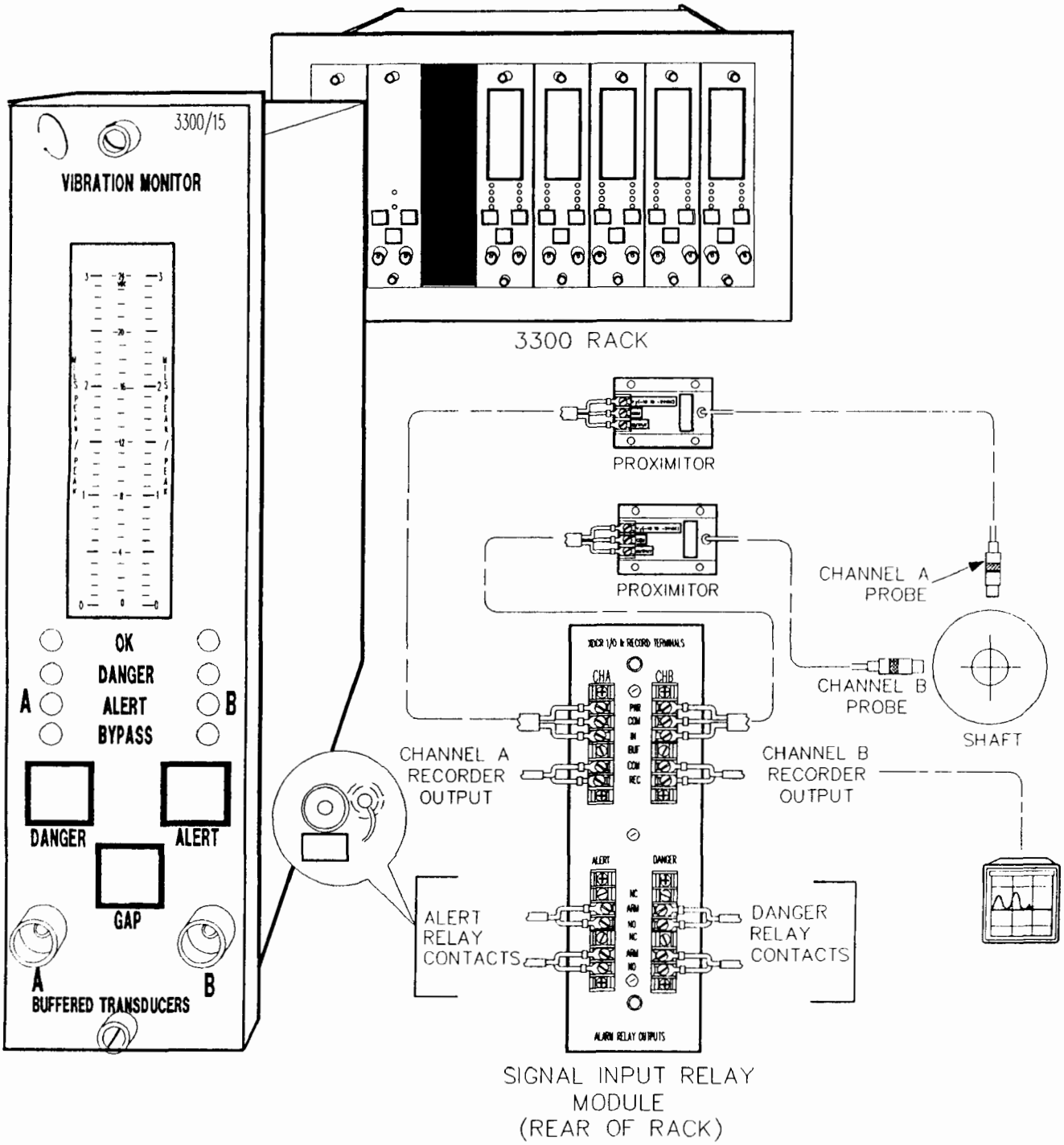
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1 DUAL VIBRATION MONITOR SYSTEM



1SID3

2 MONITOR FUNCTIONS

RADIAL VIBRATION - Radial vibration is defined as shaft dynamic motion in a direction perpendicular to the shaft centerline. The Dual Vibration Monitor displays vibration values for two channels (Channels A and B).

PROBE GAP VOLTAGE - Probe gap is measured as a negative dc voltage that is directly proportional to the gap distance between the face of a proximity probe and the surface being monitored. Probe gap voltage for each channel is displayed on the front panel meter by pressing the GAP switch.

OK - When the Proximitor output voltage is within its upper/lower OK voltage limits, the transducer is defined as OK. The OK detection circuit controls the channel OK LED and the monitor relay drive to the OK relay.

OK RELAY - The OK Relay is located on the Power Input Module. Every channel in the rack must be OK or bypassed to energize the OK Relay.

TIMED OK/CHANNEL DEFEAT - Timed OK/Channel Defeat prevents faulty transducer wiring from causing false alarms. If the probe input signal level on a given channel is not within upper/lower limits, that channel OK LED goes off, the BYPASS LED goes on, the channel is disabled, and the OK Relay deenergizes. If the channel input signal level is restored within the upper/lower OK limits for 30 seconds, the channel OK LED will start flashing at 1 Hz to indicate the OK state is restored, the BYPASS LED goes off, and monitoring is enabled. The RESET switch on the front panel of the System Monitor must be pressed to stop the OK LED from flashing (it remains on). If the channel remains in the NOT OK state, a Channel Bypass switch on the monitor circuit board can be set to put the channel "out of service". The monitor can then be operated as a single-channel monitor. Without this feature, the OK Relay could not be reactivated. In the Timed OK/Channel Defeat and Channel Bypass modes, there is no recorder output and the meter registers zero.

ALARM - Pressing the ALERT or DANGER switch on the front panel of the monitor causes the corresponding Alert (first-level alarm) or Danger (second-level alarm) alarm setpoints on each channel to be displayed on the front panel meter. ALERT and DANGER LEDs light when the vibration signal level exceeds preset levels for the selected time delay, and appropriate Alert and Danger alarm relay contacts are activated. Voting logic options determine when the Danger alarm relay contacts are activated.

FIRST OUT - Separate First Out circuits exist for Alert and Danger alarms. A monitor with First Out option selected flashes a channel alarm LED if that channel was the first channel in the rack to go into alarm. Pressing the RESET switch acknowledges the First Out condition. This allows the next channel in the rack that goes from non-alarm-to-alarm condition to indicate First Out by flashing its alarm LED.

ALARM RELAYS - Monitor alarms can be programmed for either latching or nonlatching mode. In the nonlatching mode, the alarm resets automatically when the alarm no longer exists. In the latching mode, the alarm condition must be reset manually by pressing the RESET switch on the front panel of the System Monitor (or by closing external Reset contacts). The alarm will not reset if the alarm condition still exists.

DANGER BYPASS - For maintenance functions, a DANGER BYPASS switch on the monitor circuit board is set to inhibit the Danger relay drive. This function turns on the BYPASS LEDs. Other front panel functions are not effected. This function can be disabled using a jumper within the monitor.

BUFFERED OUTPUT - The Channels A and B coaxial cable connectors on the front panel of the monitor and terminals on the Signal Input Relay Module provide buffered signals from the respective channel transducers. These connectors can be used for connection of external equipment.

TRIP MULTIPLY - The Trip Multiply function multiplies set points by 2X or 3X in response to an external contact closure through terminals on the Power Input Module. The front panel meter and recorder outputs could saturate in this mode.

RECORDER OUTPUTS - Depending on the option selected, the recorder output levels proportional to measured vibration are either 0 to -10 Vdc, +1 to +5 Vdc, or +4 to +20 mA.

SELF TEST - The monitor has three categories of self test: cyclic, power up, and user invoked.

- Power up self test is performed automatically each time the monitor power is turned on. A series of basic tests and transducer OK tests are performed. upon completion of the tests, if no errors, the monitor will perform timed OK/Channel Defeat and monitoring will resume in 30 seconds.
- Cyclic self tests is performed automatically during monitor operation. Errors encountered during cyclic tests disable the monitor, and flash a led bargraph error code. Should the error be intermittent the monitor will return to operation, but the error codes are stored for retrieval during user-invoked self tests. Stored error codes are indicated by OK LED's flashing at 5 HZ provided that the channel is OK
- User invoked test performs power up self test and allows error messages stored during cyclic tests to be read and cleared. Stored errors are annunciated by flashing the OK LEDs at 5 HZ and displaying the error codes on the front panel LCD bargraph.

1S2D3

3 MONITOR OPTIONS

DUAL VIBRATION MONITOR

PART NUMBER 3300/15

FULL SCALE RANGE — AA	TRANSDUCER INPUT — BB	ALARM RELAY — CC	APPROVALS — DD	BARRIERS USED — EE	TRIP MULTIPLY — FF
01=0–3 MILS pk–pk 02=0–5 MILS pk–pk 03=0–10 MILS pk–pk 04=0–15 MILS pk–pk 05=0–20 MILS pk–pk 11=0–100 MICROMETRES pk–pk 12=0–150 MICROMETRES pk–pk 13=0–200 MICROMETRES pk–pk 14=0–400 MICROMETRES pk–pk 15=0–500 MICROMETRES pk–pk	01=7200 PROXIMITOR 200 mV/MIL 02=3000 PROXIMITOR 200 mV/MIL (MUST BE USED WITH POWER SUPPLY PROGRAMMED TO –18Vdc)	00=NONE 01=5A EPOXY SEALED 02=5A HERMETICALLY SEALED 03=QUAD RELAYS EPOXY SEALED	00=NONE 01=CSA 02=BASEEFA 03=CITY OF LA	00=NO 01=YES	00=NONE 01=2X TRIP MULTIPLY 02=3X TRIP MULTIPLY

4 PROGRAMMABLE OPTIONS

PROGRAMMABLE OPTIONS

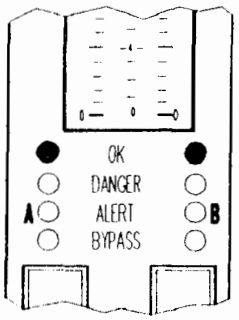
FIRST OUT	o ENABLED* o DISABLED
ALARM DELAYS	o .1 SECOND o 1 SECOND o 3 SECONDS* o 6 SECONDS
FREQUENCY RESPONSE	o 240–240,000 RPM* o 60–36,000 RPM
ALERT MODE	o LATCHING * o NON-LATCHING

DANGER MODE	o LATCHING* o NON-LATCHING
RECORDER OUTPUTS	o +4 TO +20 mA* o +1 TO +5 Vdc o 0 TO –10 Vdc
DANGER VOTING	o OR VOTING FOR RELAY DRIVE * o AND VOTING FOR RELAY DRIVE
DANGER BYPASS SWITCH	o ENABLE o DISABLE*

*SHIPPED WITH OPTION INSTALLED

1S405

5 OK



NOTE: EACH CHANNEL IN THE SYSTEM CONTROLS THE OK RELAY. THEREFORE, ANY CHANNEL CAN CAUSE A NOT OK RELAY CONDITION (DEENERGIZED RELAY).

LED DISPLAY A B	CONDITION	OK RELAY DRIVE*
● OK ●	CHANNEL A AND B IN OPERATING RANGE.	ON
○ OK ● ● OK ○	RESPECTIVE CHANNEL A OR B TRANSDUCER IN NOT OK CONDITION, OR BYPASSED. *	OFF *
○ OK ○	MONITOR IN SELF TEST, OR BOTH TRANSDUCERS NOT OK OR BY-PASSED.*	OFF *
◉ OK ◉	FLASHING AT 5 Hz = ERROR ENCOUNTERED DURING CYCLIC TEST. READ ERROR MESSAGE. (SEE 14)	ON
◉ OK ◉ ◉ OK ● ● OK ◉	FLASHING AT 1 Hz = TRANSDUCER HAS BEEN NOT OK SINCE LAST RESET.	ON

*NOT OK CHANNEL CAN BE BYPASSED TO RESTORE RELAY OK CONDITIONS

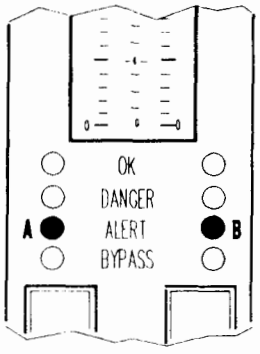
6 BYPASS



LED DISPLAY A	LED DISPLAY B	CONDITION
● BYPASS	●	o MONITOR IN DANGER BYPASS MODE o SYSTEM IN POWER UP MODE o USER INVOKED SELF TEST IN PROGRESS o TIMED OK CHANNEL DEFEAT o BOTH CHANNEL BYPASS
○ BYPASS	●	o CHANNEL A OR B BYPASSED o TIMED OK CHANNEL DEFEAT
● BYPASS	○	
◎ BYPASS	◎	TRIP MULTIPLY ACTIVATED. FLASHING OVERRIDDEN BY: o CHANNEL BYPASS o TIMED OK CHANNEL DEFEAT o DANGER BYPASS
◎ BYPASS	●	
● BYPASS	◎	

1S6D7

7 ALERT

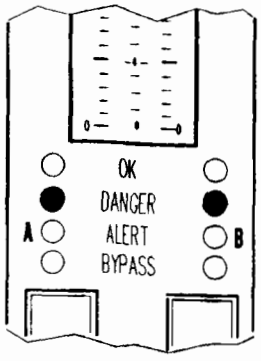


LED DISPLAY A	LED DISPLAY B	CONDITION	ALERT RELAY DRIVE
●	ALERT ○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL. (SEE 12)	ON
○	ALERT ●		ON
●	ALERT ●		ON
○	ALERT ◉	FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING SELF TEST. *	ON
◉	ALERT ○		ON

*FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS. IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS, THEY COULD CAUSE BOTH LEDS TO FLASH.

2S7D1

8 DANGER



LED DISPLAY A	LED DISPLAY B	CONDITION	DANGER RELAY DRIVE: OR VOTING	DANGER RELAY DRIVE: AND VOTING*
● DANGER	○	EITHER CHANNEL A OR B (OR BOTH) HAS EXCEEDED ALARM LEVEL. (SEE 13)	ON	OFF
○ DANGER	●		ON	OFF
● DANGER	●		ON	ON
○ DANGER	◎	FIRST OUT CONDITION FOR RESPECTIVE A OR B CHANNEL THAT HAS EXCEEDED ALARM LEVEL. TWO CHANNELS MAY INDICATE FIRST OUT FOLLOWING SELF TEST.**	ON	OFF
◎ DANGER	○		ON	OFF

*IF EITHER CHANNEL IS BYPASSED, ALARM RELAY IS ACTIVATED IF NONBYPASSED CHANNEL IS IN ALARM.

**FIRST OUT RESOLUTION IS BETTER THAN 50 MILLISECONDS IF TWO ALARMS OCCUR WITHIN 50 MILLISECONDS OR LESS OF EACH OTHER THEY COULD CAUSE BOTH LEDS TO FLASH.

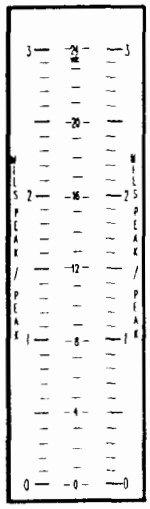
2S801

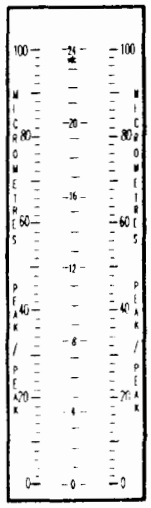
9 MONITOR RANGES

3300/15 [ ][ ]-[ ][ ]-[ ][ ]-[ ][ ]-[ ][ ]-[ ][ ]

FULL SCALE RANGE
01=0-3 MILS pk-pk
02=0-5 MILS pk-pk
03=0-10 MILS pk-pk
04=0-15 MILS pk-pk
05=0-20 MILS pk-pk
11=0-100 MICROMETRES pk-pk
12=0-150 MICROMETRES pk-pk
13=0-200 MICROMETRES pk-pk
14=0-400 MICROMETRES pk-pk
15=0-500 MICROMETRES pk-pk

SEE [23] FOR JUMPER PROGRAMMING



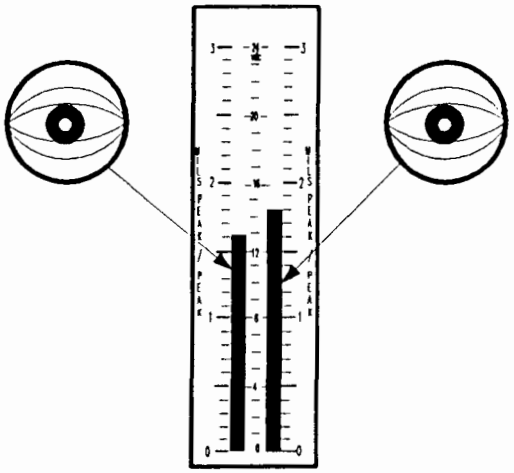


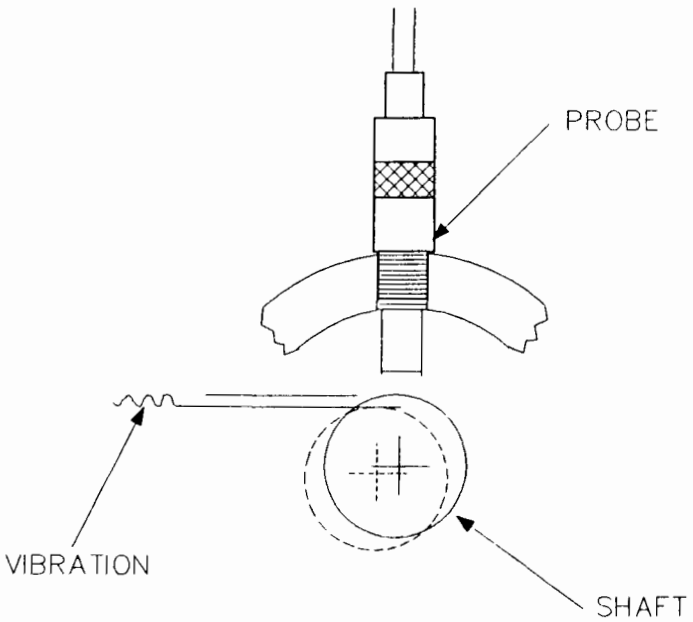
EXAMPLES OF METER SCALES

259D1

10 READ CHANNEL VIBRATION

MONITOR CONTINUOUSLY INDICATES MEASURED VIBRATION VALUES FOR CHANNELS A AND B

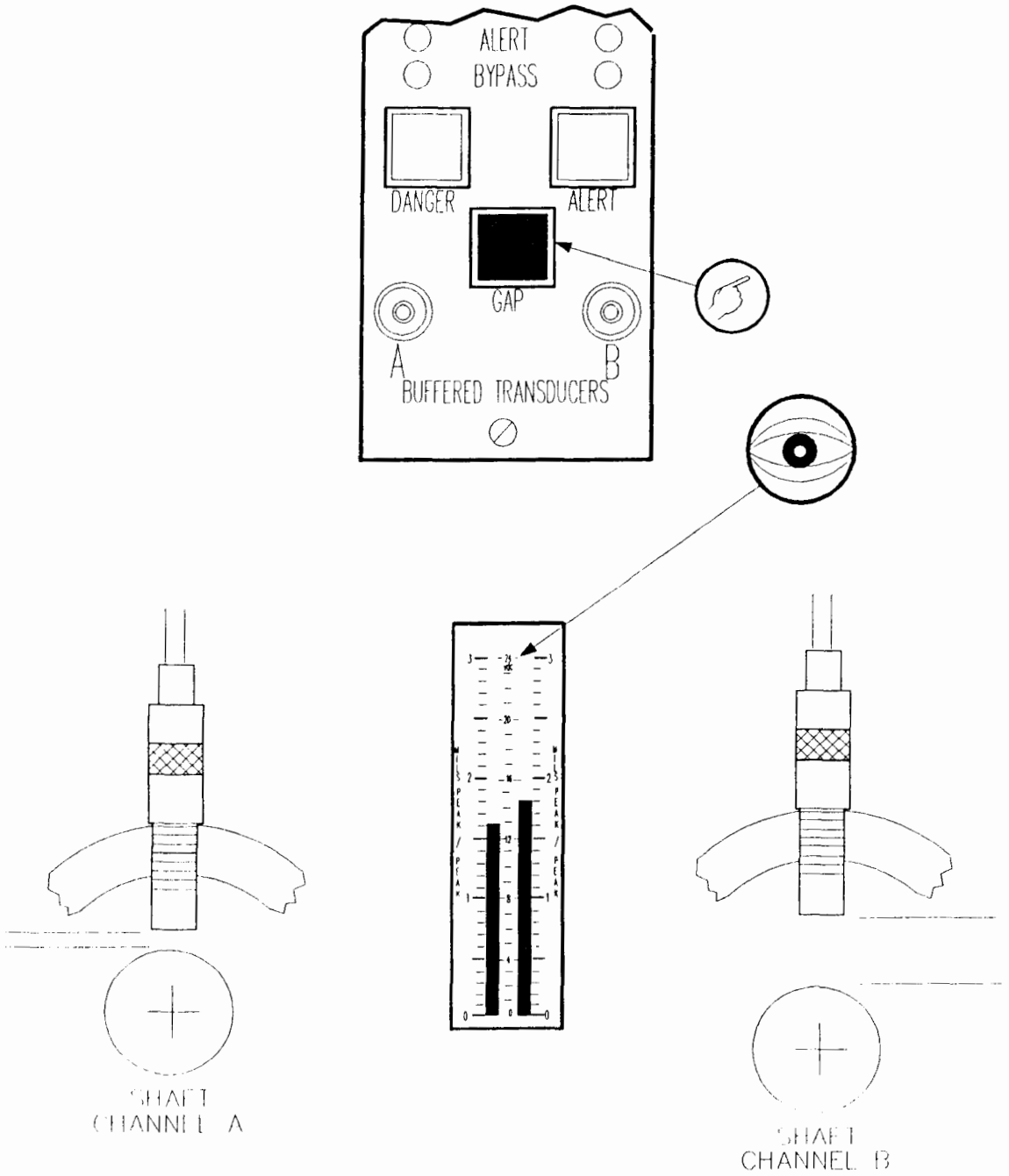




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11 READ GAP VOLTAGE

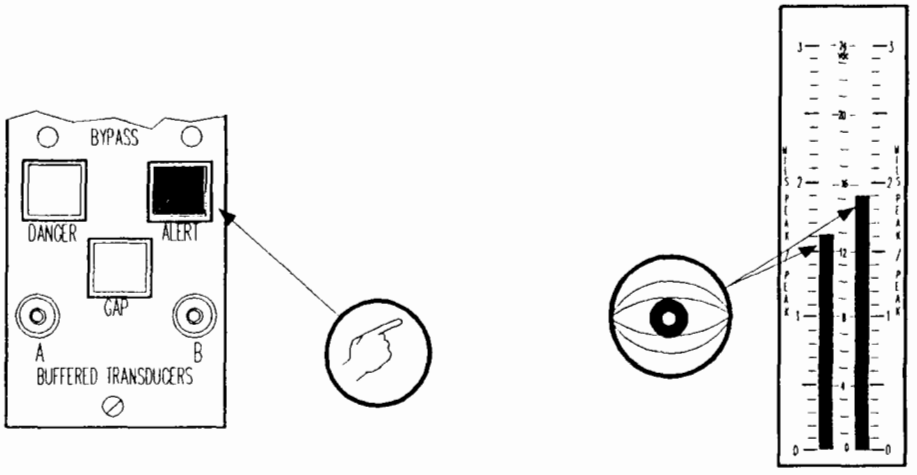
1. PRESS **GAP** SWITCH AND READ GAP VOLTAGE FOR BOTH CHANNEL A AND CHANNEL B ON METER USING CENTER METER SCALE.



2S11D1

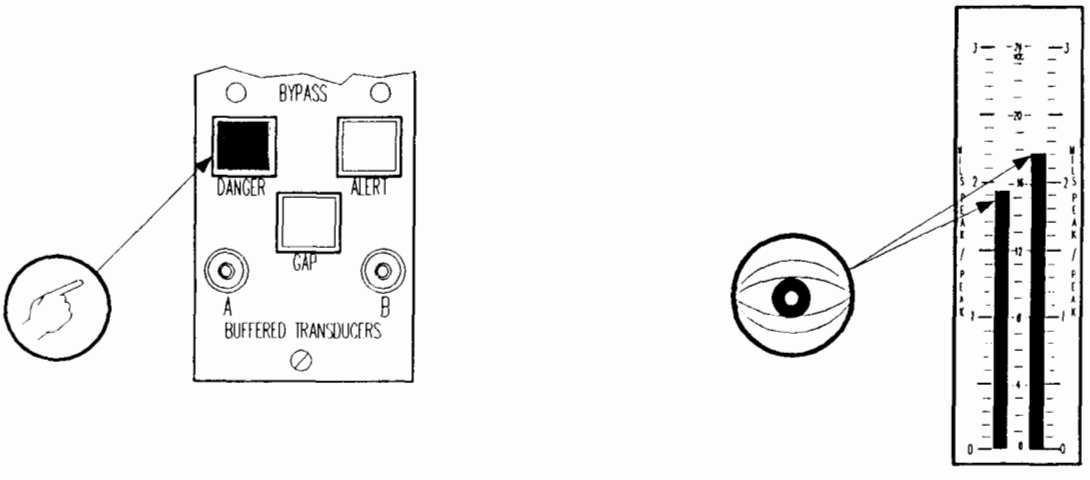
12 READ ALERT SETPOINT LEVELS

1. PRESS **ALERT** SWITCH AND READ ALERT SETPOINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE.



13 READ DANGER SETPOINT LEVELS

1 PRESS **DANGER** SWITCH AND READ DANGER SETPOINTS (FOR BOTH CHANNEL A AND B) ON METER SCALE.

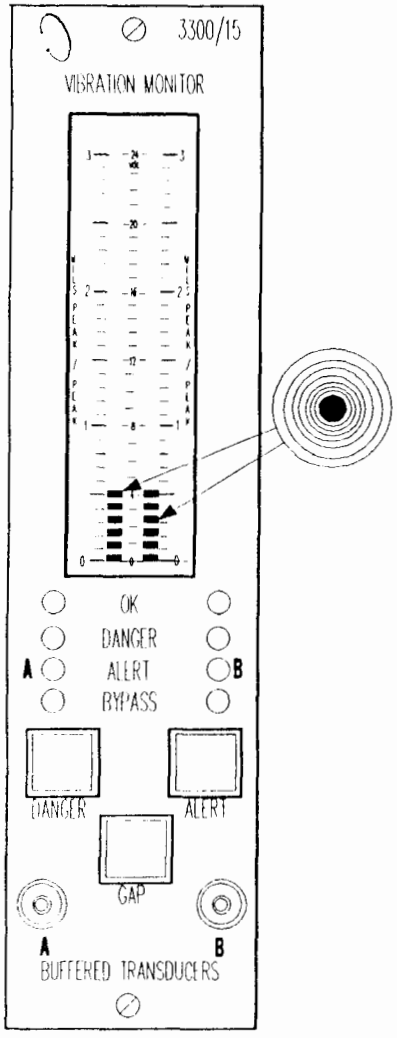


2S12D1

14 SELF TEST

THE MONITOR HAS THREE LEVELS OF SELF TESTS:

- o POWER UP TEST: PERFORMED ONLY WHEN MONITOR IS TURNED ON.
- o CYCLIC TEST: PERFORMED CONTINUOUSLY.
- o USER INVOKED TEST: PERFORMED ONLY WHEN INITIATED BY USER.



IF ERRORS ARE DETECTED DURING CYCLIC SELF TESTS:

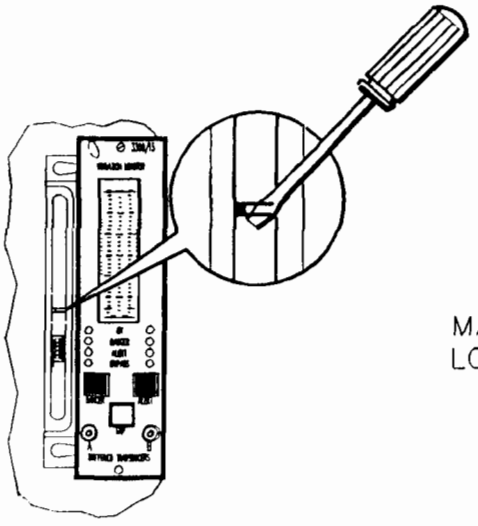
- o MONITORING IS ABORTED UNTIL THE ERROR IS RESOLVED.
- o ERROR CODE STORED IN MEMORY AND FLASHED ON LCD BARGRAPH DISPLAY.
- o **BYPASS** LED GOES ON AND **OK** LED FLASHES AT 5 HZ.
- o IF ERROR IS INTERMITTENT AND DISAPPEARS. MONITORING IS RESUMED AND **OK** LED FLASHES AT 5 HZ.
- o ERROR CODE STORED. USER INVOKED TEST DISPLAYS AND CLEARS ERROR.

IF ERRORS ARE DETECTED DURING POWER UP TEST OR USER INVOKED TEST:

- o MONITORING IS ABORTED UNTIL USER-ACTION RESOLVES PROBLEM.
- o TEST CAN BE RERUN WITH MONITOR POWER UP OR USER INVOKED TEST.

14 SELF TEST [CONT]

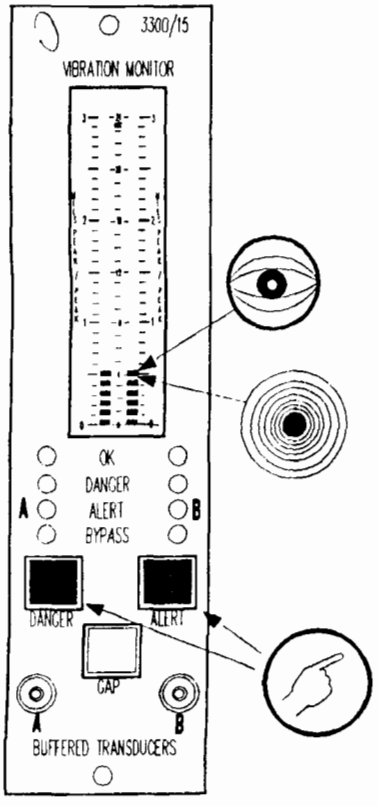
- INITIATE USER INVOKED TEST BY SHORTING ACROSS TWO SELF-TEST (ST) PINS.



CAUTION

MACHINE PROTECTION WILL BE LOST FOR DURATION OF TEST

- AT COMPLETION OF USER INVOKED TEST MONITOR WILL RECALL STORED ERROR CODES, IF ANY. THESE ERROR CODES MUST BE READ AND CLEARED WITH USER INTERACTION TO ALLOW MONITORING TO CONTINUE. TIMED OK CHANNEL DEFEAT IS ACTIVE FOR APPROXIMATELY 30 SECONDS FOLLOWING THIS ACTION.



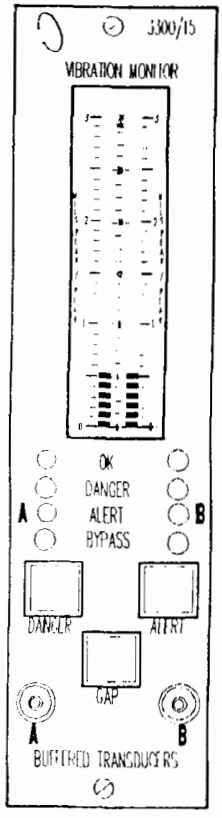
NOTE

ALTHOUGH BOTH COLUMNS ON BARGRAPH FLASH, ERROR CODE IS ONLY THE SUM OF BARGRAPH SEGMENTS DISPLAYED IN ONE COLUMN. EXAMPLE SHOWS ERROR CODE 6.

- READ CODES ON LIST; STEP THROUGH EACH ERROR CODE ON LIST BY PRESSING AND HOLDING **ALERT** SWITCH FOR APPROXIMATELY 1 SECOND.
- AT THE END OF LIST, LCD BARGRAPH DISPLAYS ALL SEGMENTS. TO REREAD LIST PRESS **ALERT** SWITCH. TO CLEAR LIST FROM MEMORY, PRESS AND HOLD **DANGER** SWITCH FOR APPROXIMATELY 1 SECOND.

2S14D2

14 SELF TEST [CONT]



ERROR CODE	DESCRIPTION
2.	ROM CHECKSUM HAS FAILED. *
3.	EEPROM FAILURE NO.1. **
4.	EEPROM FAILURE NO.2; ADJUST SET POINTS. (SEE 12 AND 13) ***
5.	+7.5/−VT NODE OUT OF TOLERANCE. **
6.	+VRH NODE OUT OF TOLERANCE. **
7.	+5V NODE OUT OF TOLERANCE. **
8.	MVREF NODE OUT OF TOLERANCE. **
9.	+7.5V NODE OUT OF TOLERANCE. **
10.	+VRL NODE OUT OF TOLERANCE. **
11.	MVREF/−6.5V NODE OUT OF TOLERANCE. **
12.	+5V/−7.5V NODE OUT OF TOLERANCE. **
13.	SCIC CLOCK FAILURE **
14.	RAM FAILURE. *
15.	IC U4 OUTPUT DISAGREES WITH GAP VOLTAGE VALUE. *

* TESTED ONLY AT POWER−UP OR USER−INVOKED SELF TEST. ERRORS NOT RECORDED, BUT ERROR CODES DISPLAYED ON FRONT PANEL METER.

* * TESTED ONLY AT CYCLIC SELF TEST. ERRORS 2, 3, 14, AND 15 ARE NONRECOVERABLE; ERRORS 5 THROUGH 13 COULD BE INTERMITTANT AND RECOVERABLE.

* * * ERROR 4 IS A SET POINT SELF TEST FAILURE. THIS MAY BE CORRECTED BY ADJUSTING ALL SET POINTS IN MONITOR.

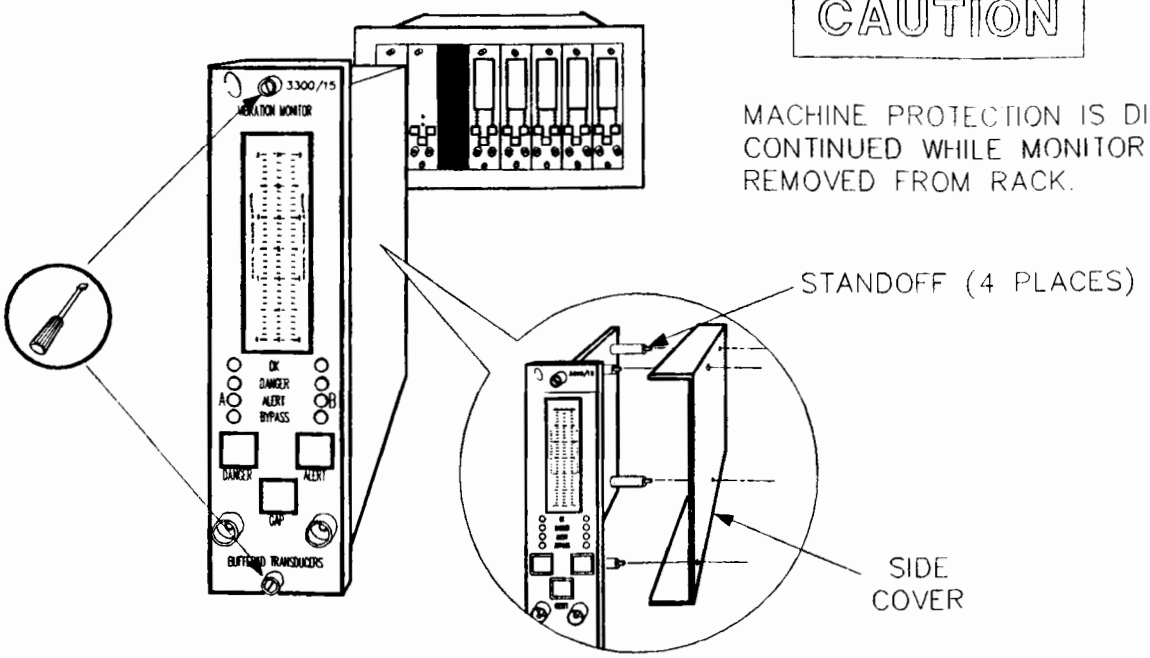
2S14D3

15 DISASSEMBLY PROCEDURE

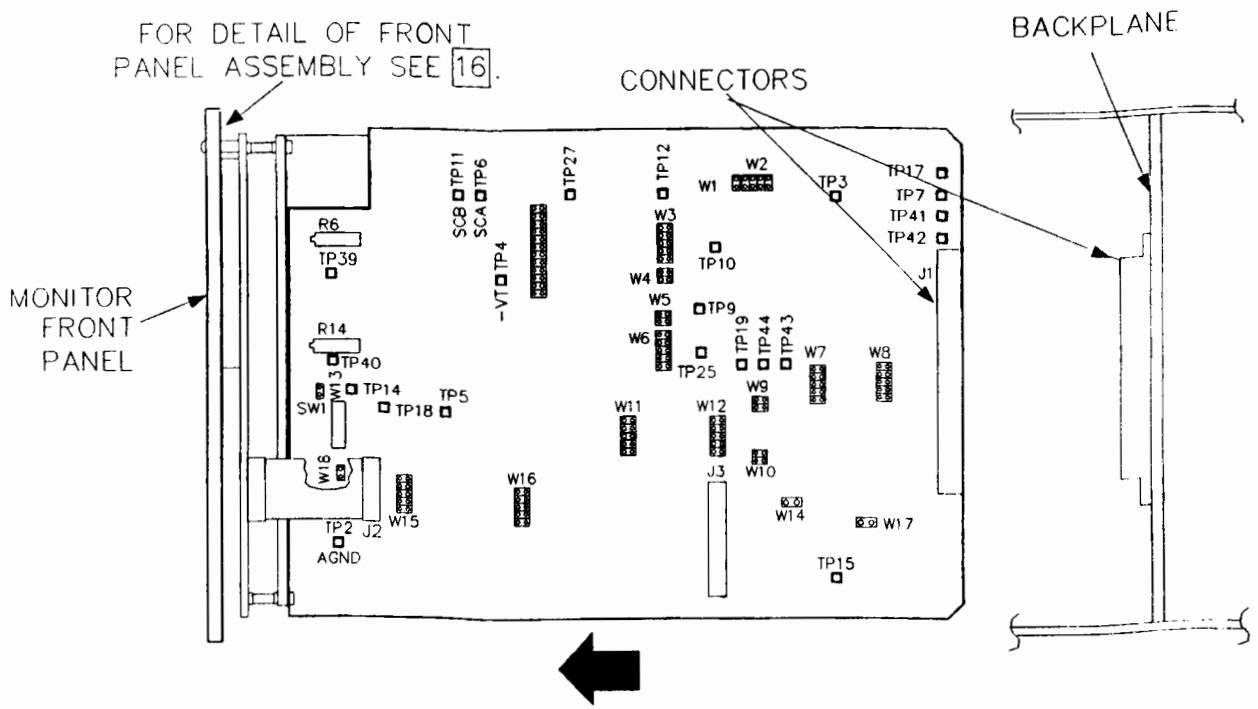
1. LOOSEN SCREWS AND PULL VIBRATION MONITOR FROM RACK.

CAUTION

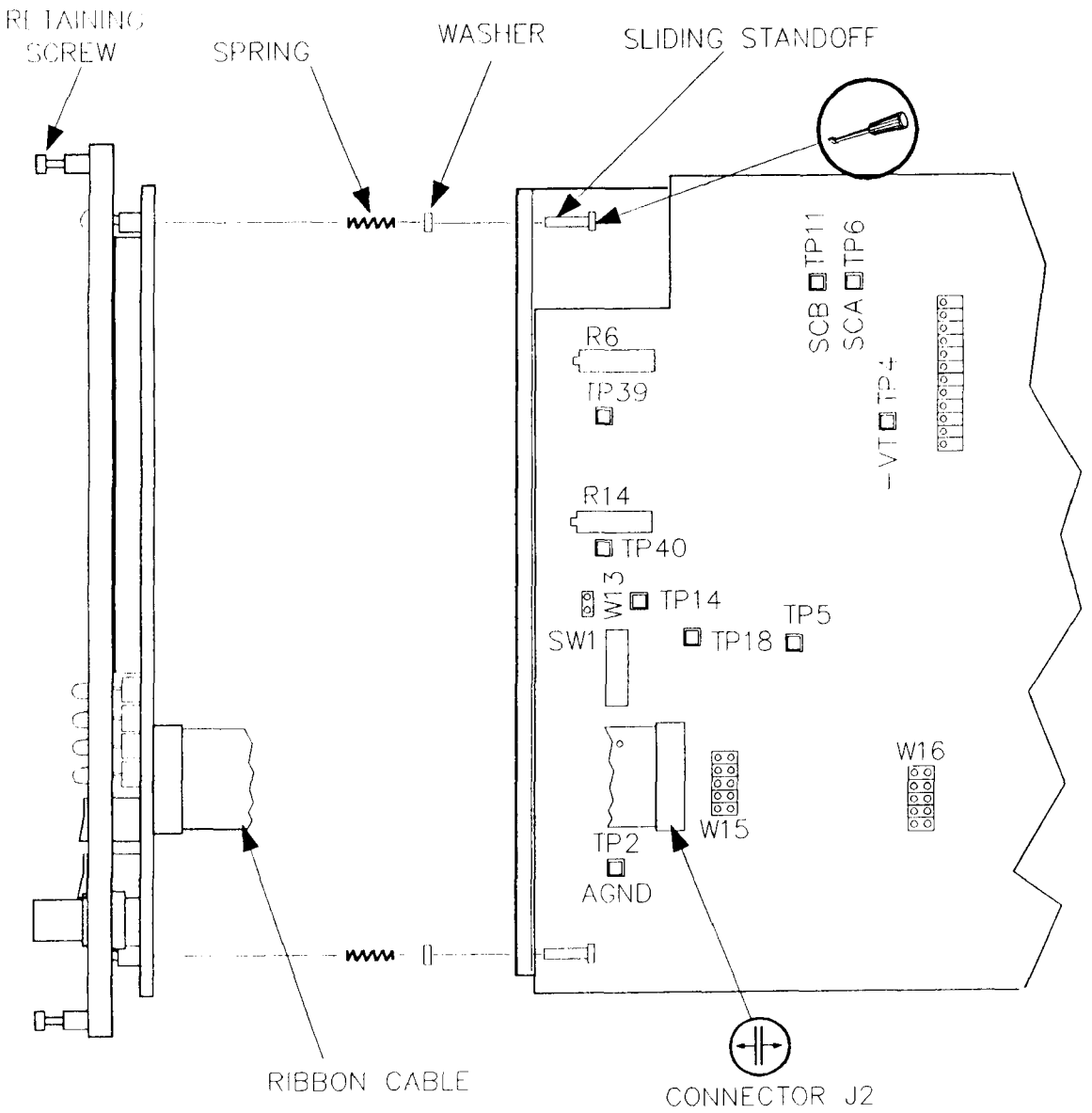
MACHINE PROTECTION IS DISCONTINUED WHILE MONITOR IS REMOVED FROM RACK.



2. REMOVE SIDE COVER BY PINCHING PROTRUDING TIP ON EACH STANDOFF.



16 FRONT PANEL ASSEMBLY REMOVAL



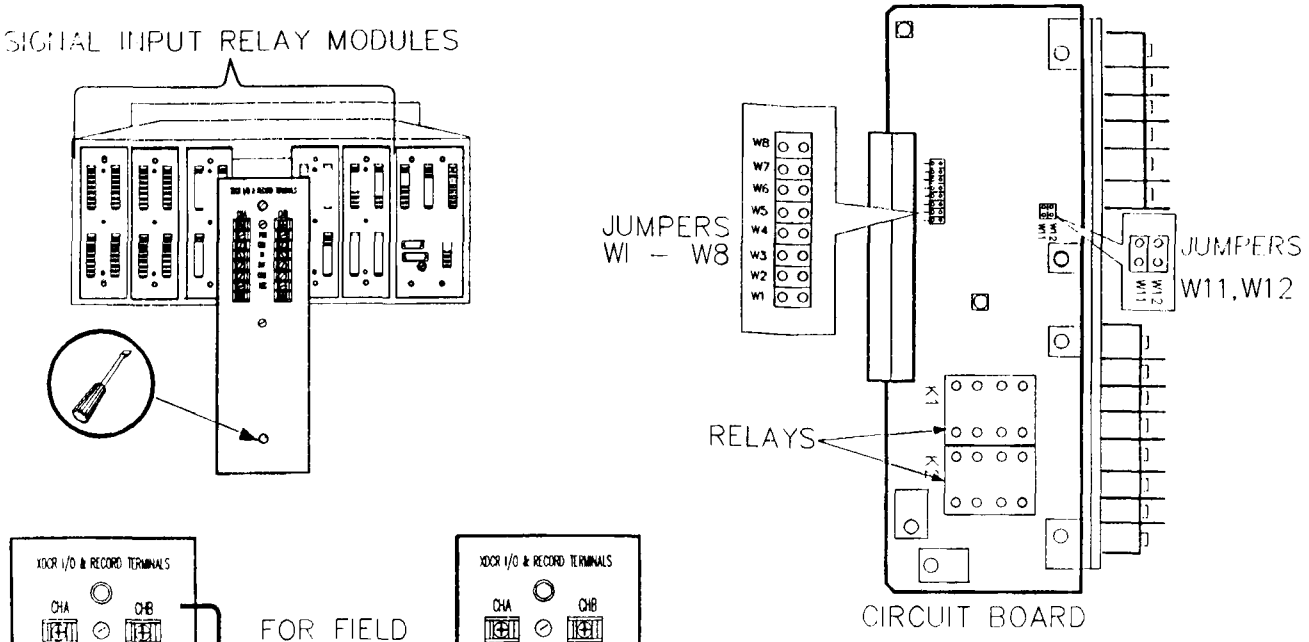
2S16D1

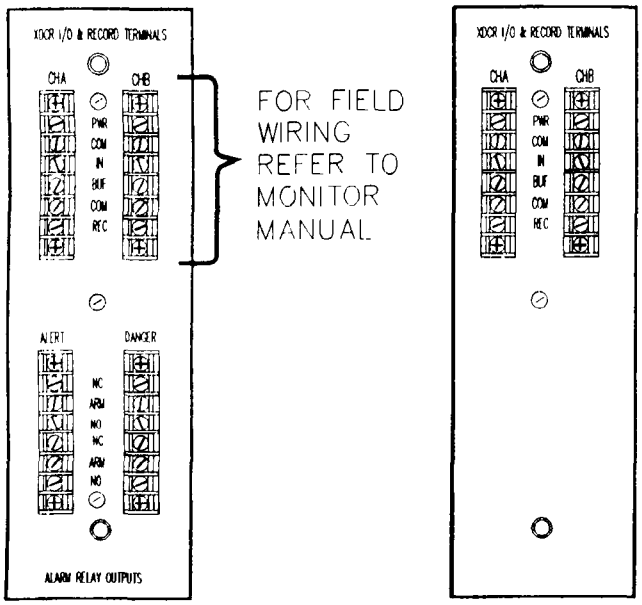
17 SIGNAL INPUT RELAY MODULES

⚠ WARNING

High voltage present could cause shock burns or death

Do not touch exposed wires or terminals





WITH RELAYS

WITHOUT RELAYS

ALERT RELAY	JUMPER *	
	IN	OUT
NORMALLY ENERGIZED	W3	W4, W11
NORMALLY DEENERGIZED	W4, W11	W3

DANGER RELAY	JUMPER *	
	IN	OUT
NORMALLY ENERGIZED	W2	W1, W12
NORMALLY DEENERGIZED	W1, W12	W2

*SEE 13 AND 14.

351701

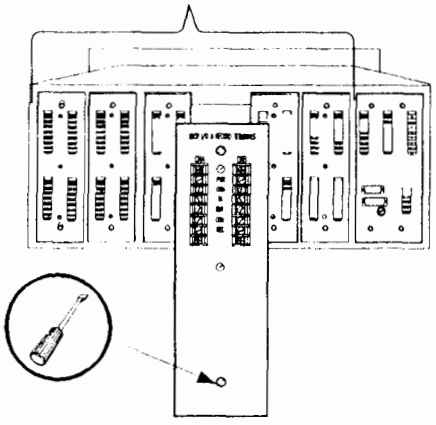
17 SIGNAL INPUT RELAY MODULES [CONT.]

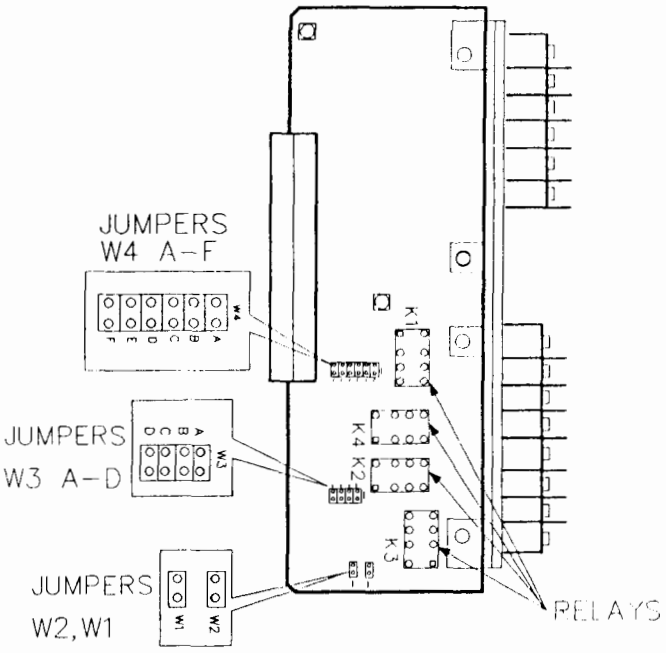
⚠ WARNING

High voltage present could cause shock burns or death

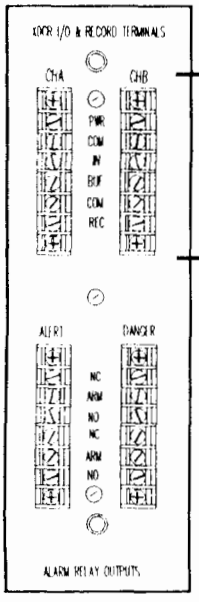
Do not touch exposed wires or terminals

SIGNAL INPUT RELAY MODULES





CIRCUIT BOARD
QUAD RELAYS



FOR FIELD WIRING REFER TO MONITOR MANUAL

*FOR INSTALLATION OF RELAY MODULES, REFER TO INSTALLATION MANUAL.

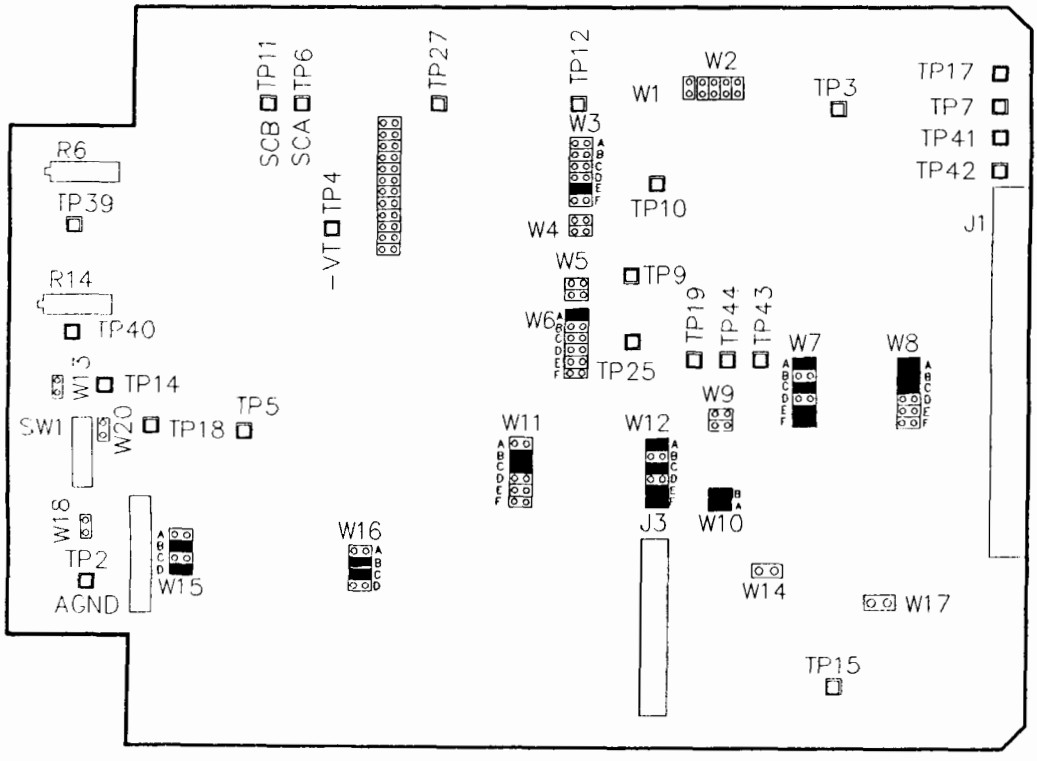
SIGNAL INPUT/QUAD RELAY CARD OPTION *		
RELAY OPTIONS	INSTALL	REMOVE
ALERT RELAYS NORMALLY DE–ENERGIZED	W2,3C W3D,4D	W3A,4C
ALERT RELAYS NORMALLY ENERGIZED	W3A,4C	W2,3C W3D,4D
DANGER RELAYS NORMALLY DE–ENERGIZED	W1,3B W4A,4E	W4B,4F
DANGER RELAYS NORMALLY ENERGIZED	W4B,4F	W1,3B W4A,4E

WITH QUAD RELAYS

18 INSTALLED PROGRAMMABLE OPTIONS

THE VIBRATION MONITOR IS SHIPPED WITH THE FOLLOWING OPTIONS INSTALLED:

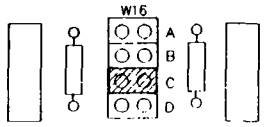
- o FIRST OUT – ENABLED
- o ALARM DELAYS – 3 SECONDS
- o FREQUENCY RESPONSE – 240 TO 240,000 RPM
- o ALERT MODE – LATCHING
- o DANGER MODE – LATCHING
- o RECORDER OUTPUT – +4 TO +20mA
- o DANGER VOTING – OR VOTING
- o FULL SCALE RANGE (AS ORDERED)
- o TRIP MULTIPLY (AS ORDERED)
- o TRANSDUCER INPUT (AS ORDERED)
- o DANGER BYPASS (DISABLED)



19 FIRST OUT, ALARM DELAYS, FREQUENCY RESPONSE OPTIONS

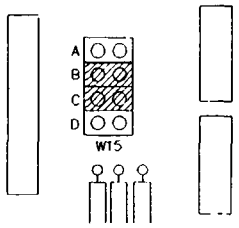
FIRST OUT

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o ENABLED	W16C	- - -
o DISABLED	- - -	W16C



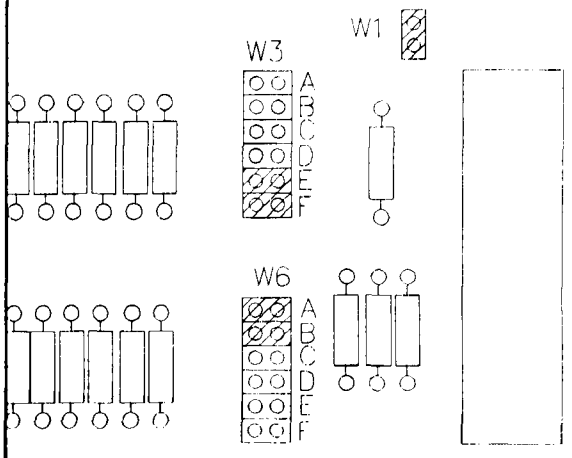
ALARM DELAYS

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o 0.1 SECOND	- - -	W15B,C
o 1 SECOND	W15C	W15B
o 3 SECONDS	W15B	W15C
o 6 SECONDS	W15B,C	- - -



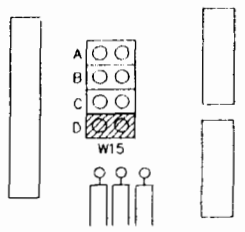
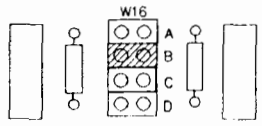
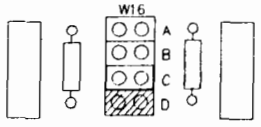
FREQUENCY RESPONSE

OPTION	JUMPERS INSTALLED	JUMPERS REMOVED
o 240 TO 240,000 RPM	W3E, W6A	W1, W3F, W6B
o 60 TO 36,000 RPM	W1, W3F, W6B	W3E, W6A



REMOVED JUMPERS CAN BE SAVED BY PLUGGING ONLY ONE PIN OF JUMPER INTO JUMPER SOCKET.

20 ALERT MODE, DANGER MODE, DANGER VOTING OPTIONS

OPTION	JUMPER LOCATIONS
ALERT MODE o LATCHING o NON LATCHING	
DANGER MODE o LATCHING o NON LATCHING	
DANGER VOTING o AND o OR	

JUMPERS	
INSTALLED	REMOVED
W15D	---
---	W15D

JUMPERS	
INSTALLED	REMOVED
W16B	---
---	W16B

JUMPERS	
INSTALLED	REMOVED
W16D	---
---	W16D

3020D1

21 RECORDER OUT, MONITOR OK LIMITS, DANGER BYPASS SWITCH

RECORDER OUT OPTION	JUMPER LOCATIONS*

+4 TO +20 mA

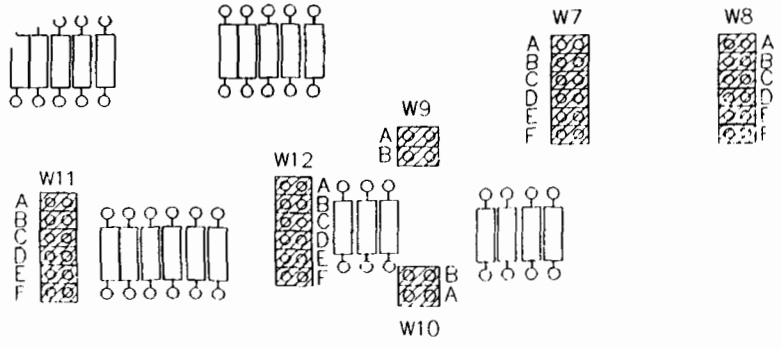
JUMPERS INSTALLED
W7A,C,E,F
W8B,C
W10A,B
W11B,C
W12A,C,E,F

+1 TO +5 Vdc

JUMPERS INSTALLED
W7B,D
W8A,E
W10A,B
W11A,E
W12B,D

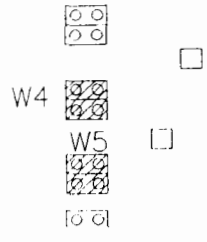
0 TO −10 Vdc

JUMPERS INSTALLED
W7B,D
W8D,F
W9A,B
W11D,F
W12B,D

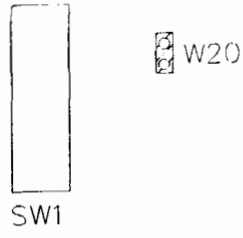


* REMOVE ALL JUMPERS FROM W7, W8, W9, W10, W11, AND W12 THEN REINSTALL ACCORDING TO TABLE.

MONITOR OK LIMITS OPTION	JUMPERS	
	INSTALL	REMOVE
3000 PROXIMITOR	W4A, W5B	W4B,W5A
7200 PROXIMITOR	W4B, W5A	W4A, W5B



DANGER BYPASS SWITCH OPTION	JUMPERS	
	INSTALL	REMOVE
ENABLE	W20	— — —
DISABLE	— — —	W20

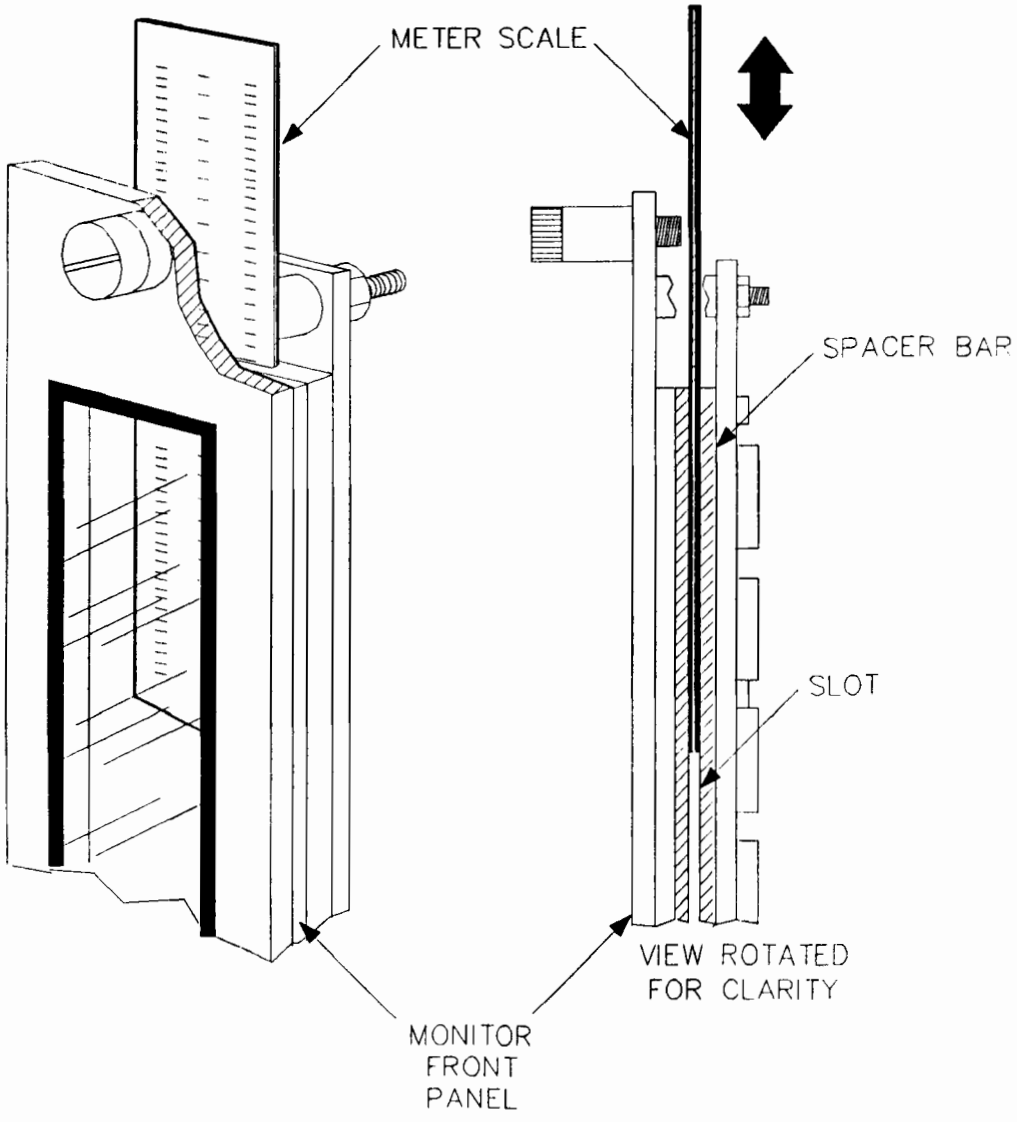


3S21D1

22 REPLACE METER SCALE

1. VERIFY MONITOR FULL SCALE OPTION (SEE 23 .)
2. OBTAIN METER SCALE FROM REAR OF MANUAL AND INSERT IN FRONT PANEL AS SHOWN.

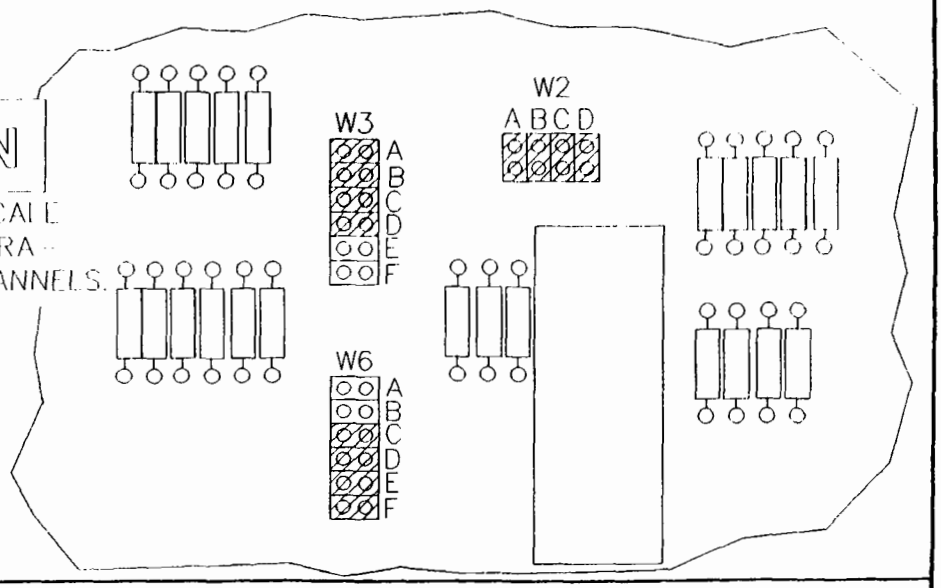
NOTE: TO ENSURE CORRECT FITTING AND ALIGNMENT, THE METER SCALE MUST BE CUT FROM THE PLASTIC SHEET EXACTLY ALONG THE MARKED OUTLINE.



3522D1

23 MONITOR FULL SCALE OPTIONS

JUMPER LOCATIONS



CAUTION

CHANGING FULL SCALE REQUIRES RECALIBRATION OF BOTH CHANNELS. (SEE 29)

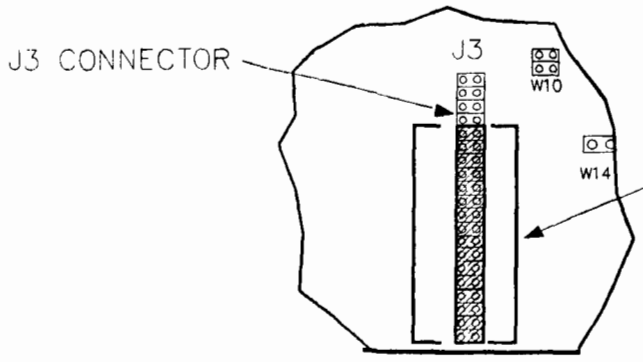
MONITOR FULL SCALE OPTIONS

	JUMPERS INSTALLED*
0 – 3 MILS	W2A, W2C, W3B, W3D, W6C, W6E
0 – 5 MILS	W2A, W3B, W3D, W6C, W6E
0 – 10 MILS	W2A, W3A, W3C, W6D, W6F
0 – 15 MILS	W2B, W2C, W2D, W3A, W3C, W6D, W6F
0 – 20 MILS	W2B, W2D, W3A, W3C, W6D, W6F
0 – 100 MICROMETRES	W2A, W2D, W3B, W3D, W6C, W6E
0 – 150 MICROMETRES	W2A, W2C, W3A, W3C, W6D, W6F
0 – 200 MICROMETRES	W2A, W2D, W3A, W3C, W6D, W6F
0 – 400 MICROMETRES	W2B, W2C, W3C, W3A, W6D, W6F
0 – 500 MICROMETRES	W2B, W2D, W3A, W3C, W6D, W6F

*REMOVE JUMPERS FROM W2 A,B,C,D, W3 A,B,C,D, AND W6 C,D,E,F BEFORE CHANGING TO A DIFFERENT FULL SCALE OPTION.

24 EXPANDER BOARD INSTALLATION/REMOVAL

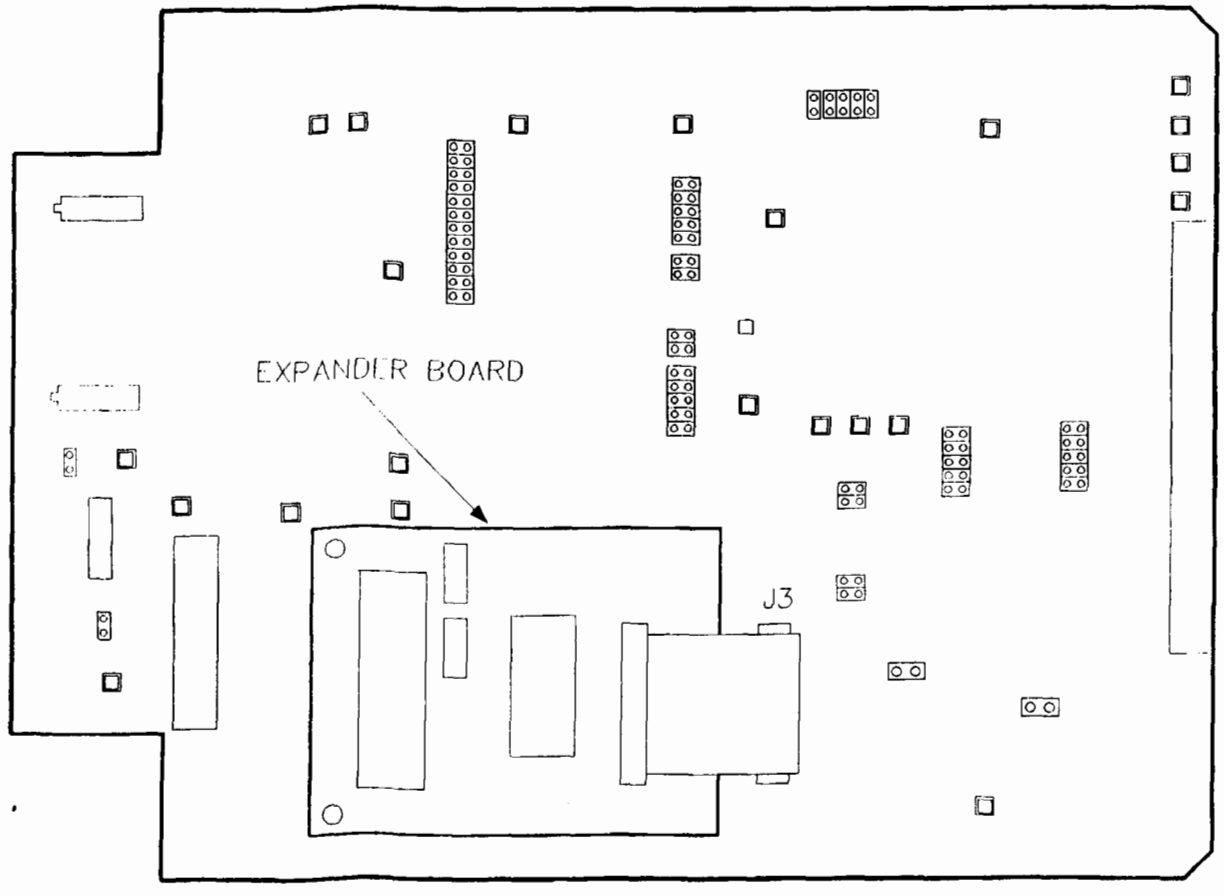
REMOVE MONITOR FROM RACK AND REMOVE SIDE COVER. (SEE 15)



CAUTION

MONITORING IS DISCONTINUED WHILE MONITOR IS REMOVED FROM RACK.

VIEW SHOWING EXPANDER BOARD REMOVED.
JUMPERS MUST BE INSTALLED AS SHOWN.



VIEW SHOWING EXPANDER BOARD INSTALLED

3524(1

25 ALARM SET POINT ADJUST

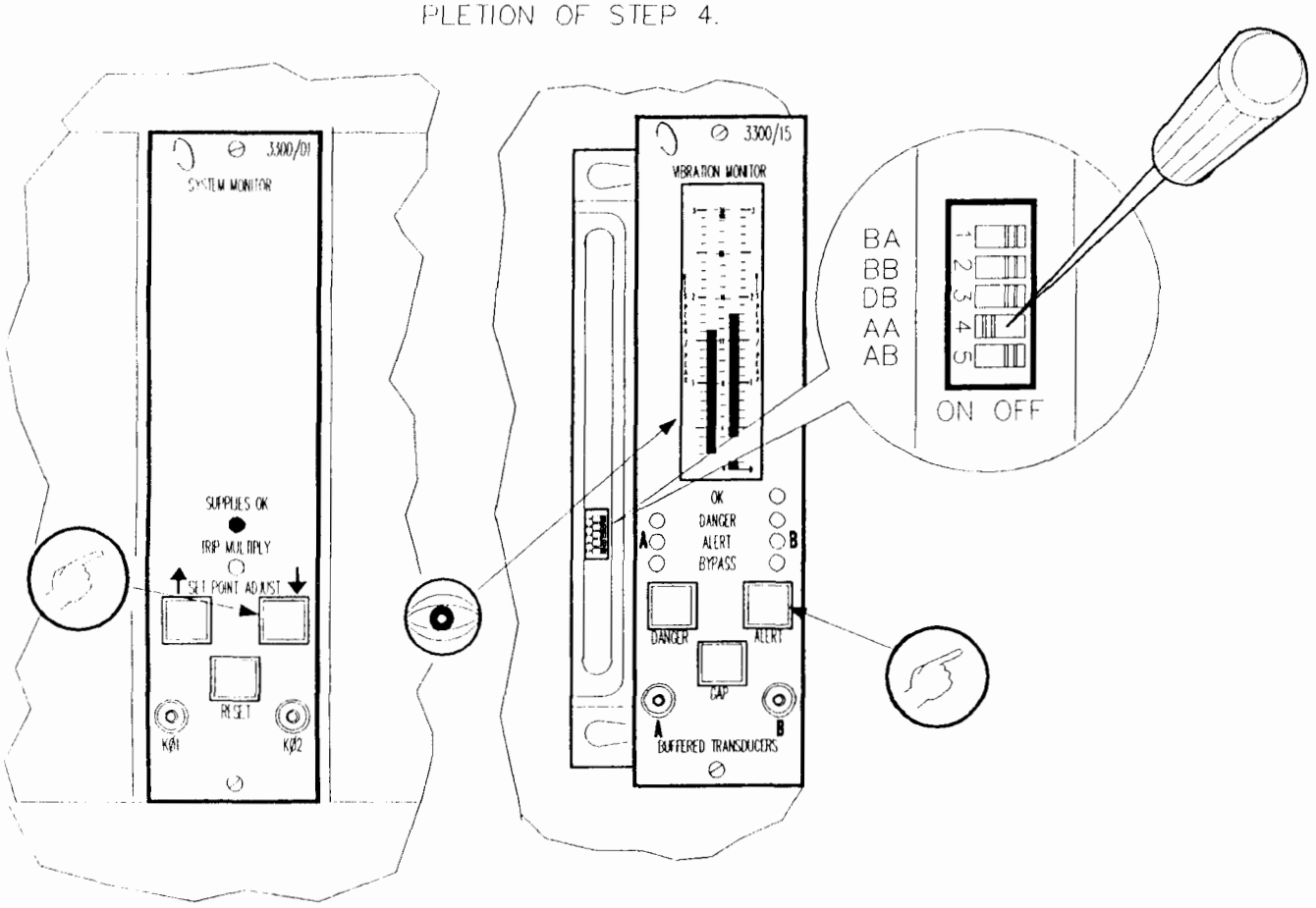
NOTE

SET POINTS CAN NOT BE ADJUSTED WITH TRIP MULTIPLY INSTALLED AND ACTIVATED BY CONTACT CLOSURE.

1. OPEN FRONT PANEL, SET RESPECTIVE **AA** (CHANNEL A ADJUST) OR **AB** (CHANNEL B ADJUST) SWITCH TO ON; RESPECTIVE CHANNEL BARGRAPH STARTS FLASHING.
2. TO ADJUST **ALERT** OR **DANGER** SET POINTS, PRESS AND HOLD **ALERT** OR **DANGER** SWITCH ON FRONT PANEL.
3. USE ↑ OR ↓ SWITCHES ON SYSTEM MONITOR TO ADJUST SET POINT LEVEL UP OR DOWN.
4. RESET **AA** OR **AB** SET SWITCH; CLOSE FRONT PANEL.

NOTE

MONITOR RESPONDS TO PREVIOUS SET POINT LEVEL UNTIL THE COMPLETION OF STEP 4.



3S2501

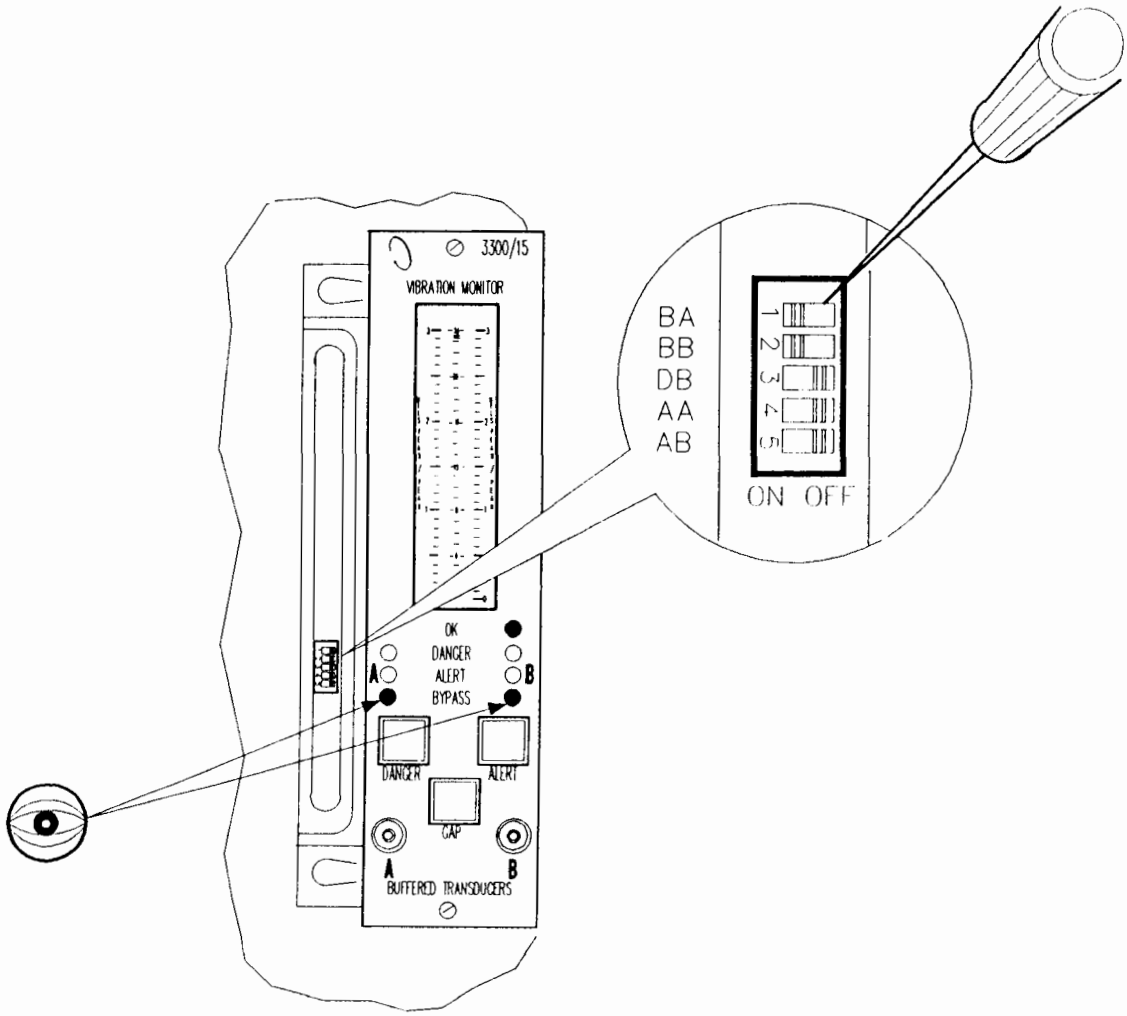
26 CHANNEL BYPASS

SET **BA** (CHANNEL A BYPASS) OR **BB** (CHANNEL B BYPASS) SWITCH TO ON.
CORRESPONDING BYPASS LED GOES ON, **OK** LED GOES OFF, AND AMPLITUDE GOES TO 0.

CAUTION

MACHINE PROTECTION WILL
BE LOST WHILE CHANNEL
BYPASS IS ON.

NOTE
WHEN CHANNEL BYPASS IS SWITCHED ON,
CHANNEL ALARMS ARE CLEARED.



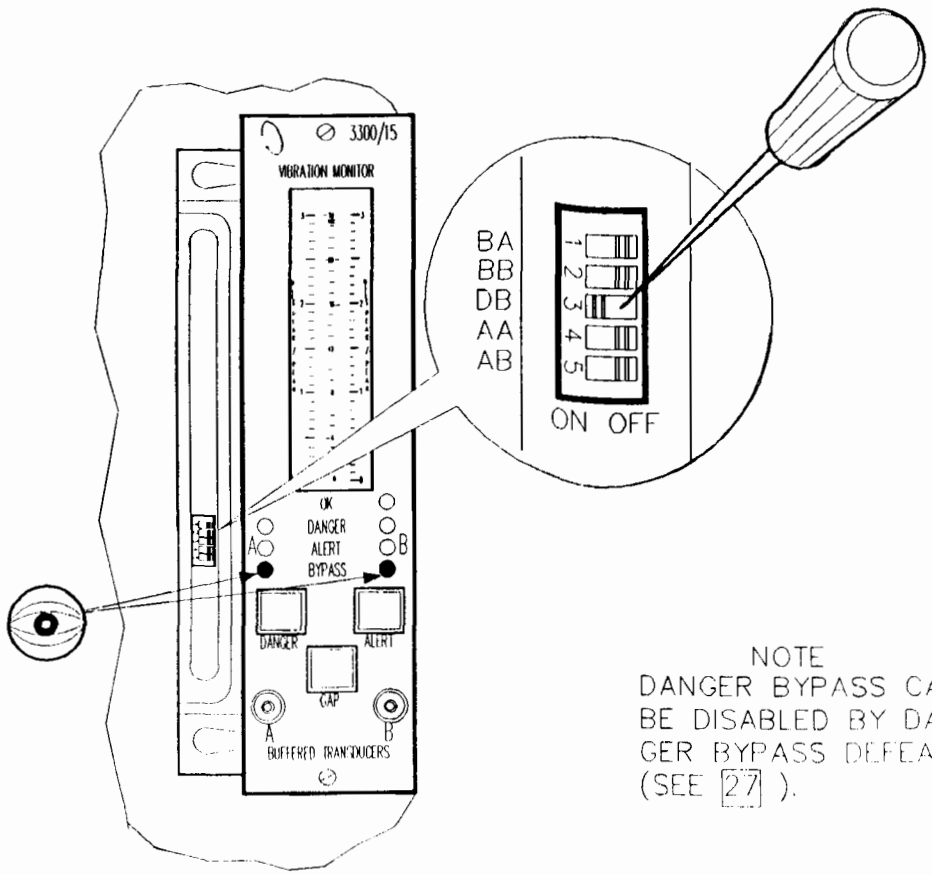
3526D1

27 DANGER BYPASS

SET **DB** DANGER BYPASS SWITCH TO ON; BOTH CHANNEL BYPASS LEDs GO ON. DANGER ALARM LEDs ON FRONT PANEL CAN GO ON BUT DANGER RELAY DRIVE WILL NOT BE ACTIVATED IF A DANGER SET POINT IS EXCEEDED. SEE [13] TO READ DANGER SET POINTS.

CAUTION

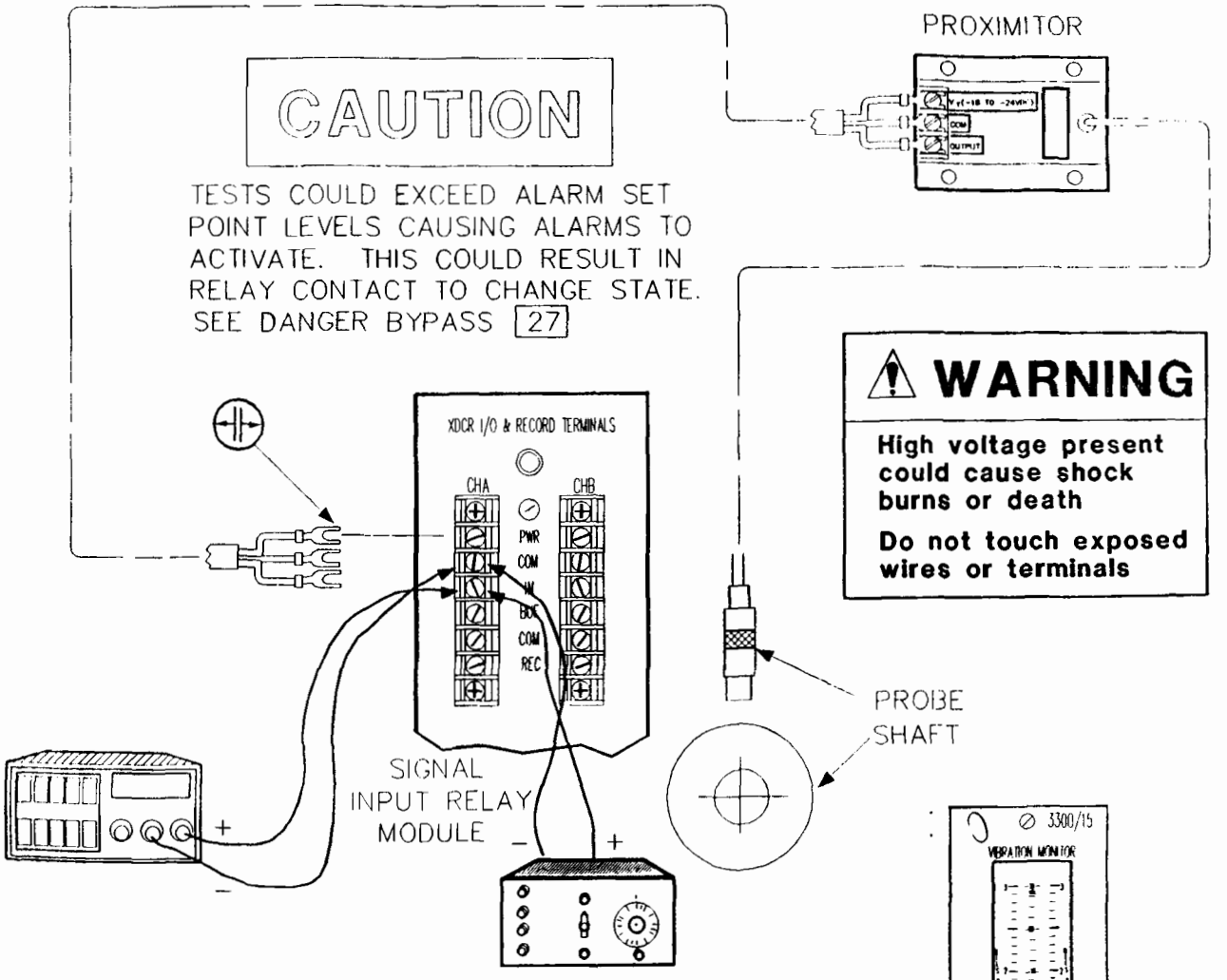
MACHINE PROTECTION WILL BE LOST WHILE DANGER BYPASS IS ON.



NOTE
DANGER BYPASS CAN BE DISABLED BY DANGER BYPASS DEFEAT. (SEE [27]).

3527D1

28 TEST CHANNEL ALARMS



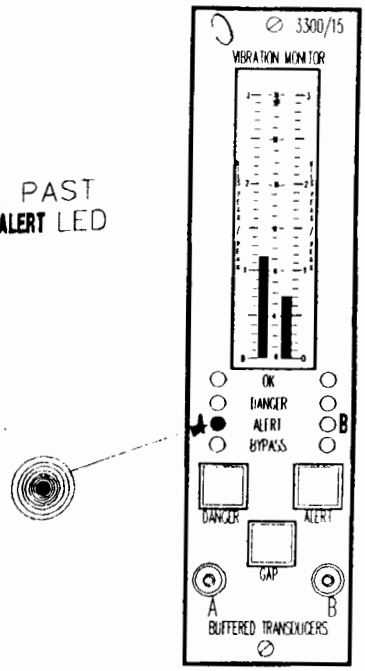
1. DISCONNECT **COM** AND **IN** WIRING FROM CHANNEL A TERMINALS ON SIGNAL INPUT RELAY MODULE.
2. CONNECT MULTIMETER AND FUNCTION GENERATOR (WITH 100 Hz SINE WAVE AND −7Vdc BIAS) ADJUST AMPLITUDE BELOW ALARM SET POINT LEVELS.
3. WAIT FOR TIMED OK CHANNEL DEFEAT DELAY THEN PRESS **RESET** SWITCH ON SYSTEM MONITOR.
4. VERIFY **OK** LEDs ARE ON, AND **ALERT** AND **DANGER** LEDs ARE OFF.

4S28D1

28 TEST CHANNEL ALARMS [CONT.]

5. INCREASE FUNCTION GENERATOR AMPLITUDE PAST ALERT SET POINT LEVEL AND VERIFY THAT **ALERT** LED GOES ON (FLASHING IF FIRST OUT OPTION).

6. VERIFY THAT ALERT RELAY CHANGED STATE.

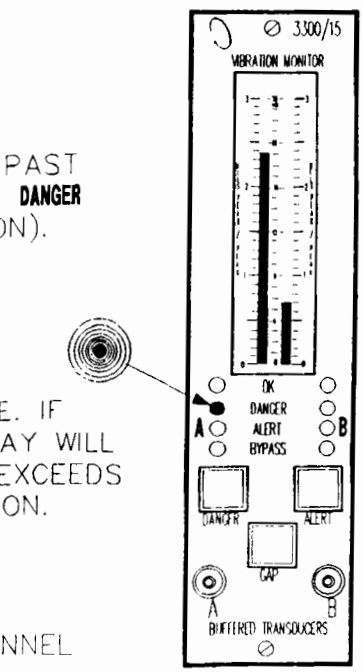


7. PRESS **RESET** SWITCH AND VERIFY THAT **ALERT** LED REMAINS ON STEADY.

8. INCREASE FUNCTION GENERATOR AMPLITUDE PAST DANGER SET POINT LEVEL AND VERIFY THAT **DANGER** LED GOES ON (FLASHING IF FIRST OUT OPTION).

9. VERIFY THAT DANGER RELAY CHANGED STATE. IF DANGER "AND" VOTING LOGIC SELECTED, RELAY WILL NOT CHANGE STATE UNTIL OTHER CHANNEL EXCEEDS DANGER SETPOINT OR IF DANGER BYPASS IS ON.

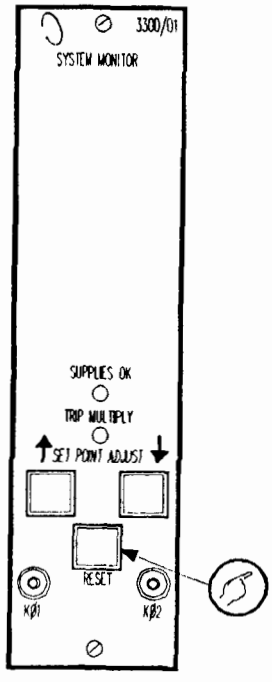
10. AND VOTING IS NOT ACTIVE IF SECOND CHANNEL IS BYPASSED.

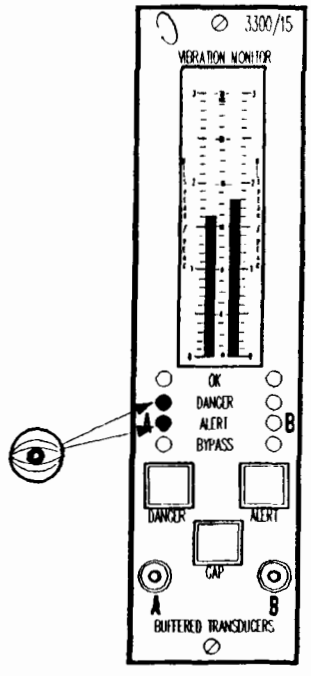


4528D2

28 TEST CHANNEL ALARMS [CONT.]

11. PRESS **RESET** SWITCH. VERIFY **ALERT** AND **DANGER** LEDS REMAIN ON AND STEADY.

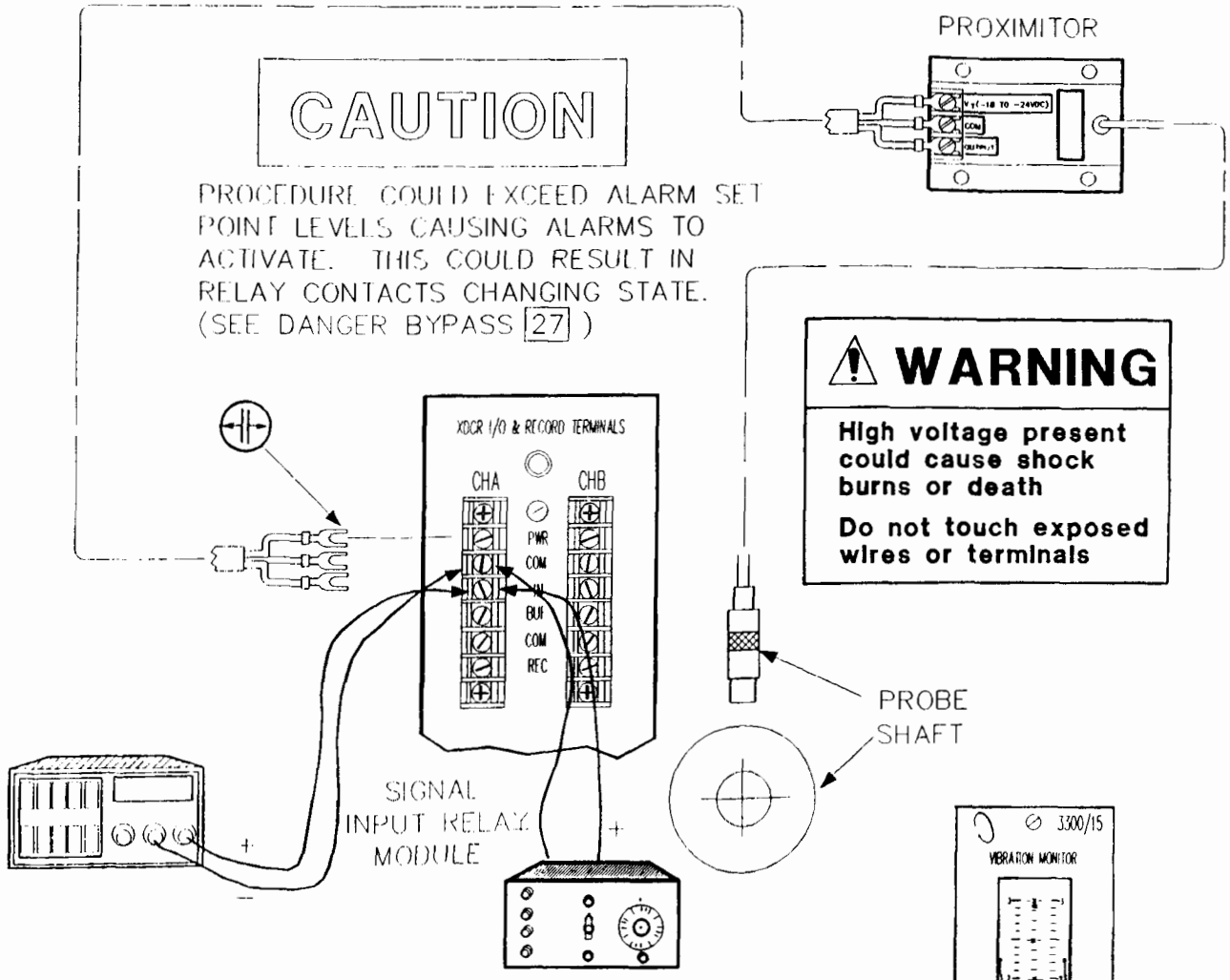




12. REDUCE FUNCTION GENERATOR AMPLITUDE TO BELOW ALARM SET POINT LEVELS AND OBSERVE THAT **ALERT** AND **DANGER** LEDs GO OFF (IF NONLATCHING). PRESS **RESET** SWITCH TO RESET LATCHING ALARMS. IF MONITOR OPTION FF IS −01 OR −02 (SEE [3]). THIS TEST MUST BE REPEATED IN TRIP MULTIPLY MODE (2X OR 3X) WITH TRIP MULTIPLY ACTIVATED. (SEE **TRIP MULTIPLY** LED ON SYSTEM MONITOR). IN TRIP MULTIPLY MODE, SET POINTS ARE MULTIPLIED BY EITHER 2X OR 3X.

4328D3

29 CALIBRATE CHANNEL



1. DISCONNECT **COM** AND **IN** WIRING FROM CHANNEL A TERMINALS ON SIGNAL INPUT MODULE.
2. CONNECT MULTIMETER AND FUNCTION GENERATOR.
3. ADJUST FUNCTION GENERATOR (WITH 100 Hz SINE WAVE AND −7 Vdc BIAS). ADJUST AMPLITUDE FOR METER FULL SCALE.
   - 1 MIL = 200 mV p-p
     (10 MICROMETRES = 79 mV p-p)

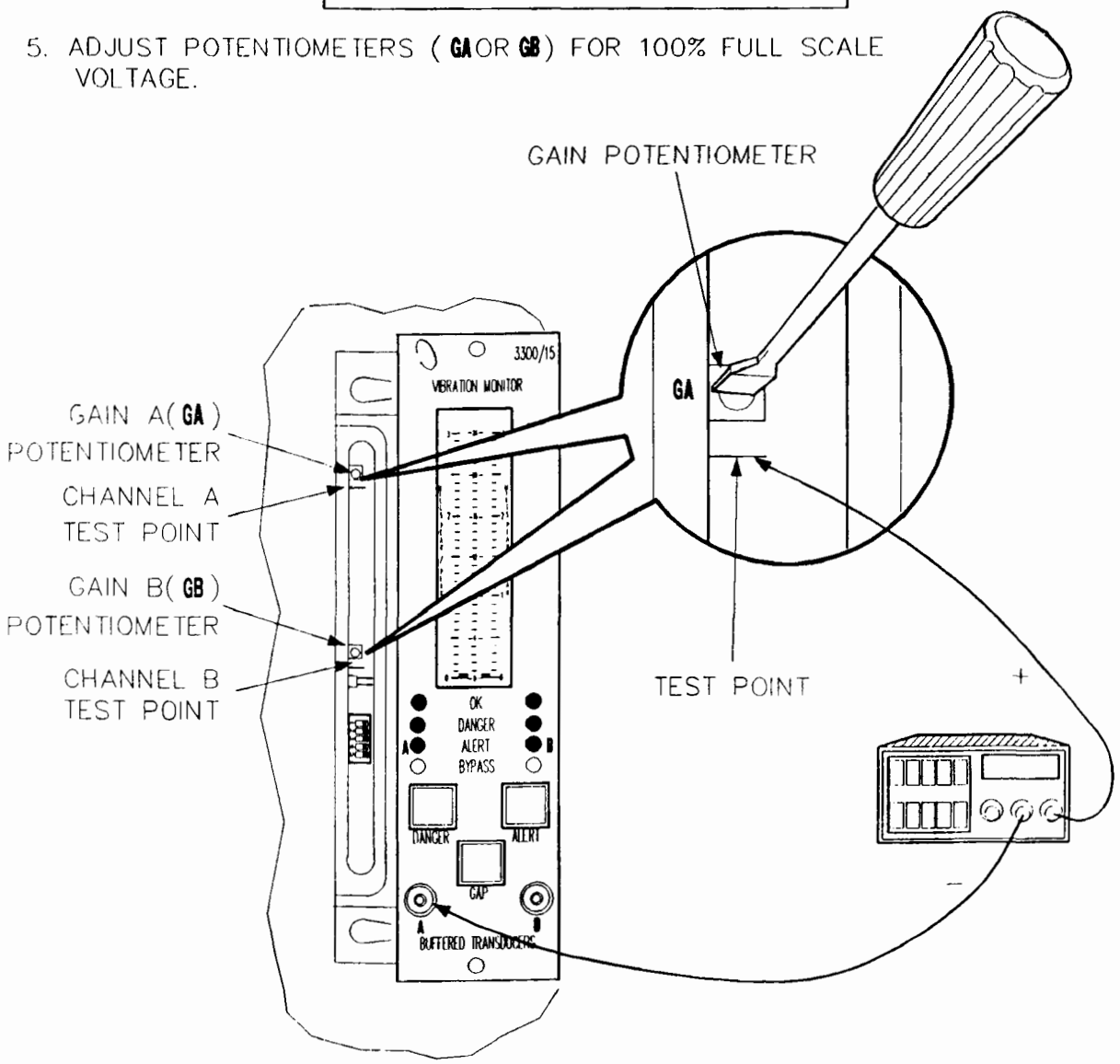
4S29D1

29 CALIBRATE CHANNEL [CONT.]

4. LOOSEN RETAINING SCREWS, SLIDE FRONT PANEL TO RIGHT, AND MEASURE PROPROTIONAL SIGNAL OUTPUT AT APPROPRIATE SIGNAL OUTPUT TEST POINTS (A OR B).

PROPORTIONAL OUTPUT =	
NO TRIP MULTIPLY	+5.00 Vdc
2X TRIP MULTIPLY	+2.50 Vdc
3X TRIP MULTIPLY	+1.67 Vdc

5. ADJUST POTENTIOMETERS (**GA** OR **GB**) FOR 100% FULL SCALE VOLTAGE.



VERIFY RECORDER OUTPUT TO THE OPTION SELECTED.

4S29D2

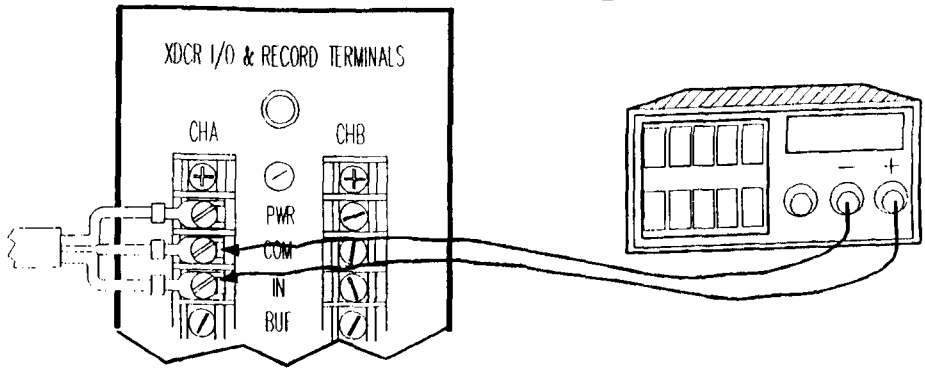
30 TEST OK LIMITS

1. CONNECT MULTIMETER TO CHANNEL A OF SIGNAL INPUT RELAY MODULE

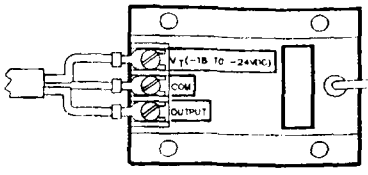
⚠ WARNING

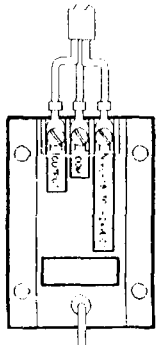
High voltage present could cause shock burns or death

Do not touch exposed wires or terminals

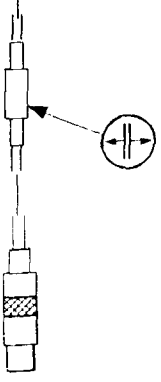


2. DISCONNECT EXTENSION CABLE FROM PROBE
3. RECONNECT EXTENSION CABLE TO AN IDENTICAL SUBSTITUTE PROBE IN TK3 CALIBRATION INSTRUMENT.



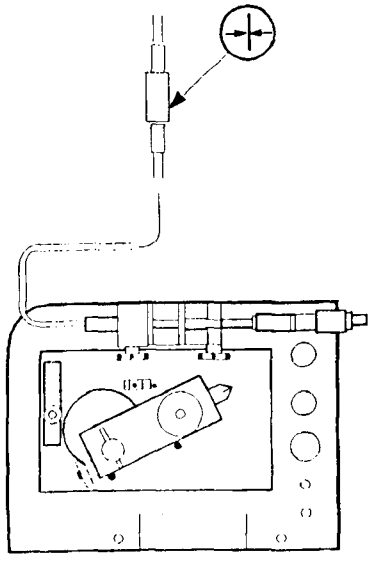


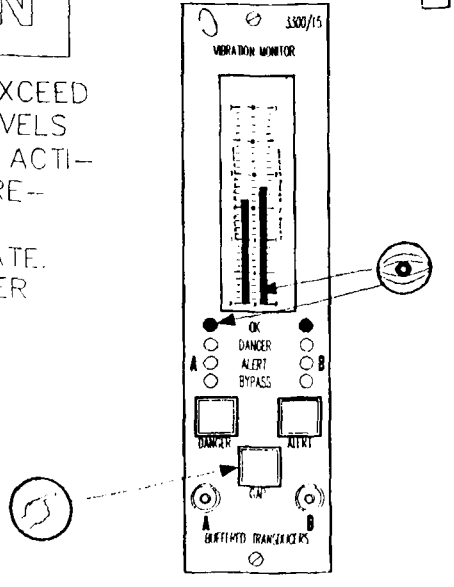
4. SET GAP VOLTAGE FOR APPROXIMATELY –9 Vdc.
5. VERIFY THAT CHANNEL B **OK** LED IS ON. PRESS **RESET** AND VERIFY BOTH **OK** LEDS ARE ON BEFORE CONTINUING.



CAUTION

PROCEDURE COULD EXCEED ALARM SET POINT LEVELS CAUSING ALARMS TO ACTIVATE. THIS COULD RESULT IN RELAY CONTACTS CHANGING STATE. SEE [27] FOR DANGER BYPASS.



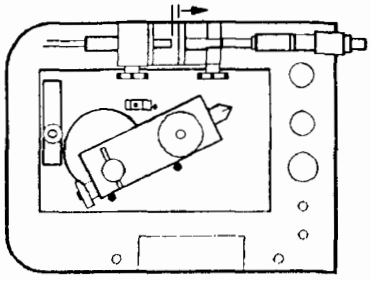


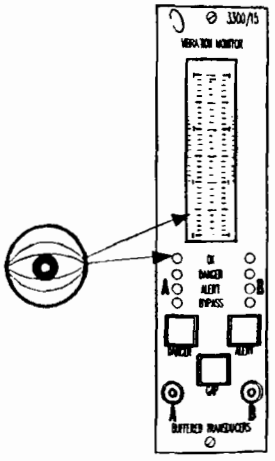
30 TEST OK LIMITS [CONT.]

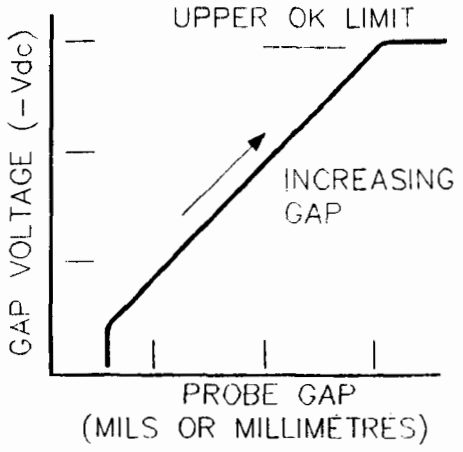
6. INCREASE GAP UNTIL **OK** LED GOES OFF (UPPER LIMIT).
7. CHECK PROBE GAP VOLTAGE ON MULTIMETER:

−15.8 Vdc TO −16.8 Vdc	7200 TRANSDUCER
−10.5 Vdc TO −11.6 Vdc	3000 TRANSDUCER

8. VERIFY CHANGE STATE OF OK RELAY. NOTE THAT ALL CHANNELS MUST BE OK OR BYPASSED IN ORDER FOR THE **ARM** AND **NO** CONTACTS OF THE OK RELAY (NORMALLY ENERGIZED) TO BE CONNECTED.

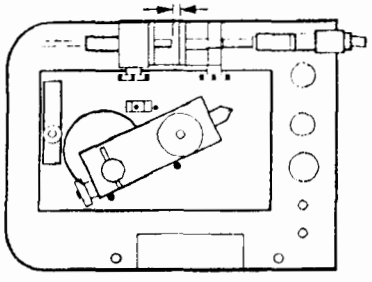


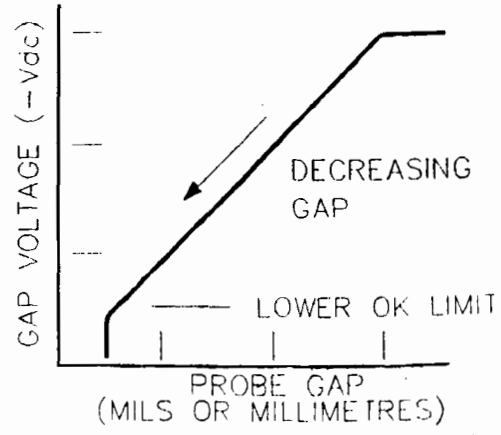




9. GRADUALLY DECREASE PROBE GAP TO −9 Vdc AND WAIT 30 SECONDS. PRESS **RESET** UNTIL **OK** LED GOES ON. **OK** LED SHOULD BE ON BETWEEN UPPER AND LOWER OK LIMITS.
10. DECREASE PROBE GAP UNTIL **OK** LED GOES OFF (LOWER LIMIT).
11. CHECK PROBE GAP VOLTAGE ON MULTIMETER:

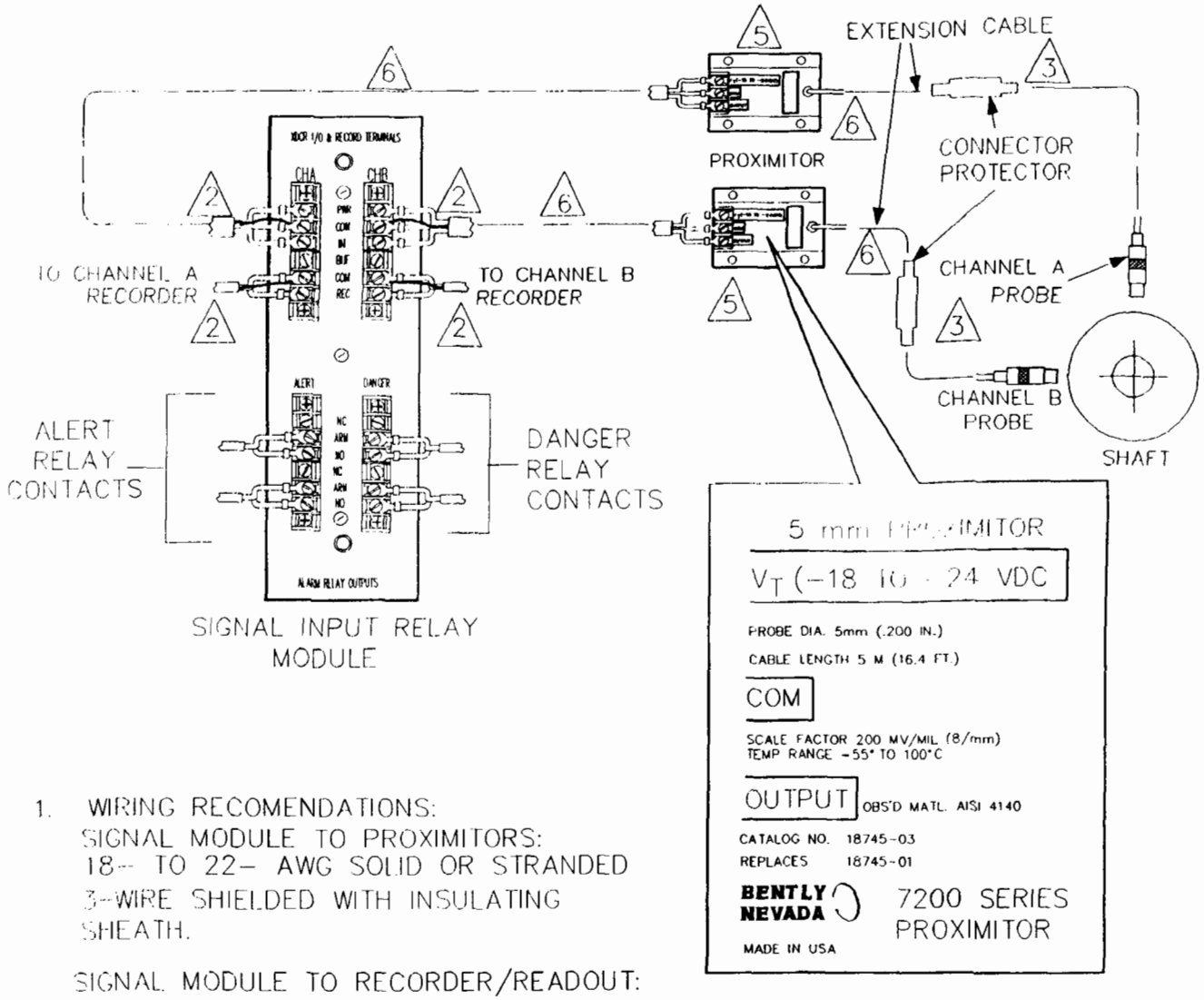
−2.7 Vdc TO −3.3 Vdc	7200 TRANSDUCER
−1.7 Vdc TO −2.1 Vdc	3000 TRANSDUCER





45302

31 FIELD WIRING DIAGRAMS



1. WIRING RECOMENDATIONS:
   SIGNAL MODULE TO PROXIMITORS:
   18– TO 22– AWG SOLID OR STRANDED 3-WIRE SHIELDED WITH INSULATING SHEATH.

   SIGNAL MODULE TO RECORDER/READOUT:
   18– TO 22– SOLID OR STRANDED, 2-WIRE SHIELDED WITH INSULATING SHEATH.

△2 SHIELDS TERMINATED TO SIGNAL MODULE COMMON.

△3 TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOR KIT PN40113-02.

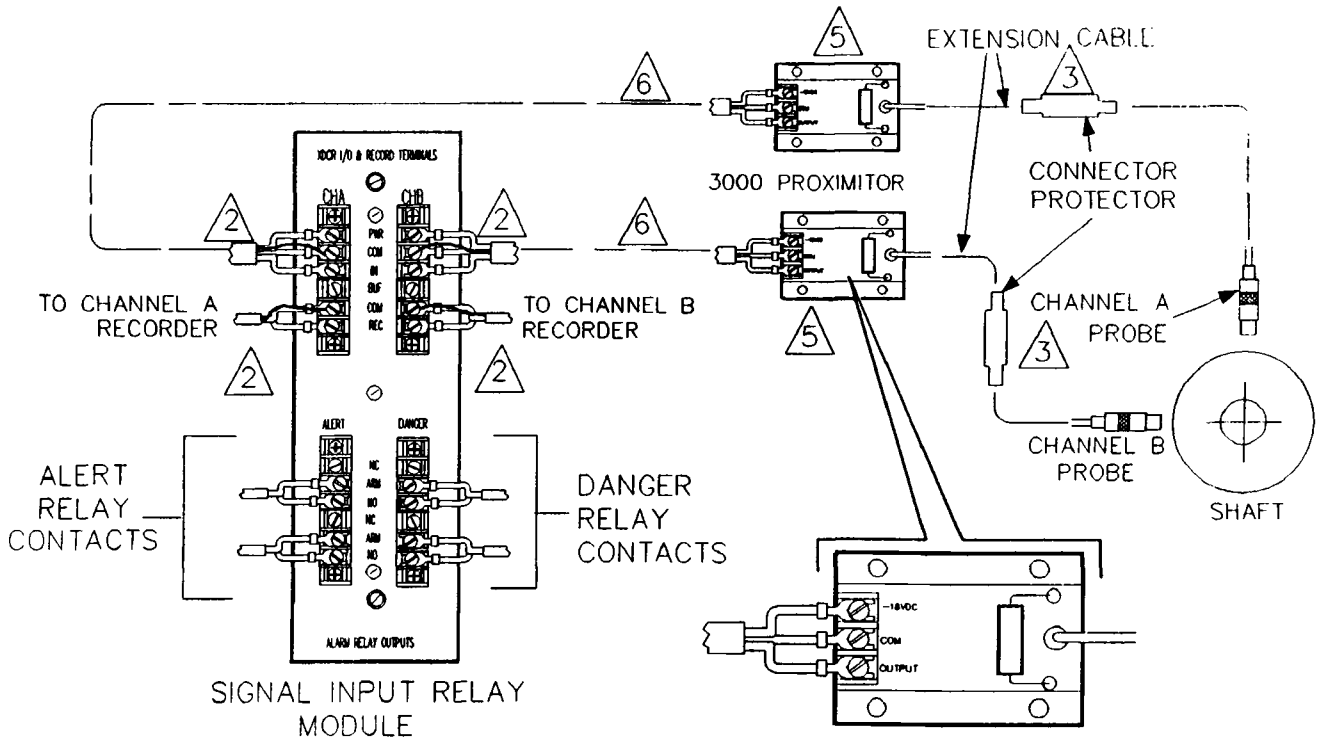
4. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMMON (COM) CONNECTION IS RECOMMENDED.

△5 PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PN 19094-01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

△6 MAXIMUM CABLE LENGTH BETWEEN SIGNAL INPUT RELAY MODULE AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

4531D1

31 FIELD WIRING DIAGRAMS [CONT.]



1. WIRING RECOMMENDATIONS:

   SIGNAL MODULE TO PROXIMITORS: 18– TO 22– AWG SOLID OR STRANDED, 3 WIRE SHIELDED WITH INSULATING SHEATH.
   SIGNAL MODULE TO RECORDER/READOUT: 18– TO 22– AWG SOLID OR STRANDED, 2–WIRE SHIELDED WITH INSULATING SHEATH.

△2. SHIELDS TERMINATED TO SIGNAL MODULE COMMON.

△3. TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOR KIT PN40113–02.

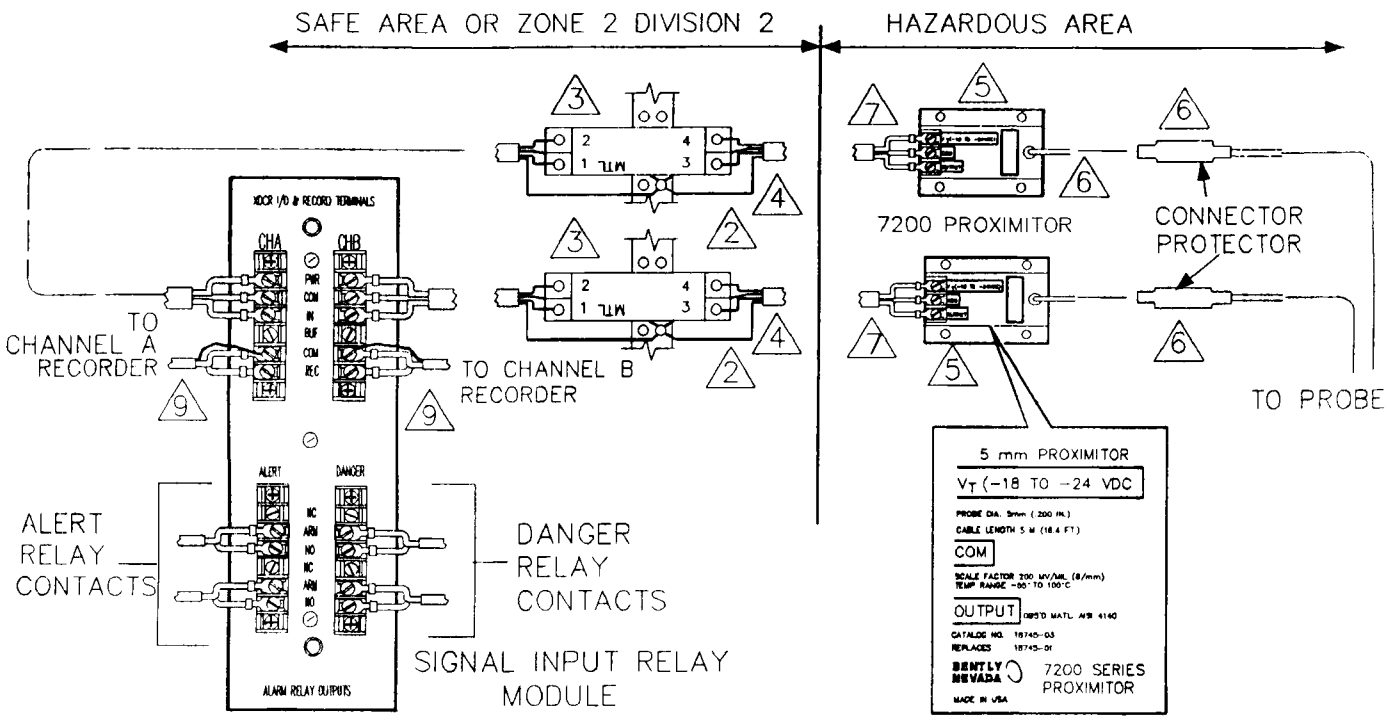
4. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMON (COM) CONNECTION IS RECOMMENDED.

△5. PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PN 19094–01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

△6. MAXIMUM CABLE LENGTH BETWEEN SIGNAL INPUT RELAY MODULE AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

4S31D2

31 FIELD WIRING DIAGRAMS [CONT.]



1. WIRING RECOMMENDATIONS:
   SIGNAL MODULE TO BARRIER-BARRIER TO PROXIMITOR: 14- TO 18- AWG SOLID OR STRANDED, 3 WIRE SHIELDED WITH INSULATING SHEATH
   SIGNAL MODULE TO RECORDER/READOUT: 18- TO 22- AWG SOLID OR STRANDED, 2-WIRE SHIELDED WITH INSULATING SHEATH.

△2. SHIELDS ARE JOINED AS SHOWN TERMINATING AT BARRIER GROUND. SHIELDS SHOULD BE INSULATED.

△3. USE MTL SAFETY BARRIER PER DWG BA22000, NOTE 17.

△4. BARRIERS ARE MOUNTED TO BARRIER RAIL. BARRIER RAIL IS THE SYSTEM GROUND AND IS USED TO TERMINATE THE POTENTIAL EQUALIZATION BUS. TOTAL EARTH LOOP IMPEDANCE MUST NOT EXCEED 1 OHM.

△5. PROXIMITOR CASE MUST BE ELECTRICALLY ISOLATED FROM EARTH GROUND. ELECTRICAL ISOLATION: 500 VAC (RMS) MIN. ISOLATION KIT PN 19094-01 MAY BE USED TO SATISFY THE ISOLATION REQUIREMENT.

△6. TO ELECTRICALLY ISOLATE AND PROTECT COAXIAL CONNECTIONS, USE CONNECTOR PROTECTOR KIT PN 40113-02.

△7. MAXIMUM CABLE LENGTH BETWEEN BARRIER AND PROXIMITOR MUST NOT EXCEED 1000 FEET (300 METRES).

△8. TO MINIMIZE GROUND LOOP NOISE PROBLEMS, A SINGLE POINT EARTH GROUND (GND) TO SYSTEM COMMON (COM) CONNECTION IS RECOMMENDED.

△9. RECORDER SHIELDS TERMINATE AT RACK SIGNAL COMMON.

10. BARRIERS LOCATED IN DIVISION 2 OR ZONE 2 HAZARDOUS AREAS MUST BE INSTALLED IN NEMA 4 OR IP 54 OR APPROVED PROTECTIVE HOUSING.

11. MONITORS MUST BE RE-CALIBRATED WITH BARRIERS IN THE LINES.

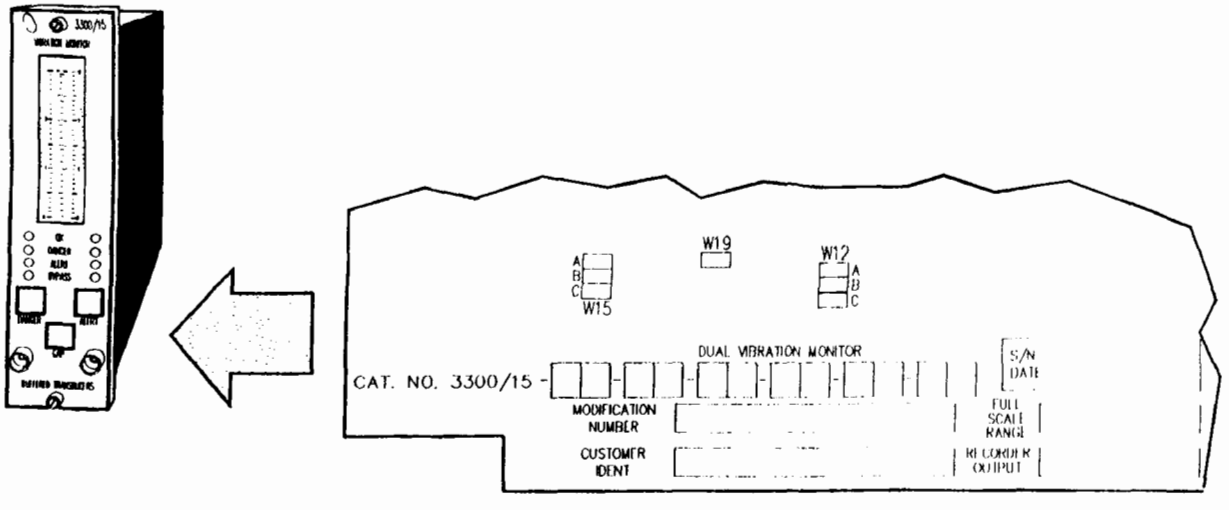
4S31D3

32 RECOMMENDED SPARE PARTS

QTY PER MON	DESCRIPTION	REPLACEMENT PART NUMBER
1	FRONT PANEL ASSEMBLY	81543-01 *
1	MONITOR CIRCUIT ASSEMBLY	78392-01 *
1	SIGNAL INPUT RELAY MODULE	
	NO RELAY	81544-01 *
	EPOXY SEALED RELAY	81545-01 *
	QUAD EPOXY SEALED	84152-01 *
	HERMETICALLY SEALED RELAY	81546-01 *
	NO RELAY, WITH INTERNAL BARRIERS	84345-03 *
	EPOXY SEALED RELAY, WITH INTERNAL BARRIERS	84345-02 *
	HERMETICALLY SEALED RELAY, WITH INTERNAL BARRIERS	84345-01 *

* **TO ORDER REPLACEMENT PARTS, SPECIFY THE COMPLETE CATALOG NUMBER, 3300/15 - □□-□□-□□-□□-□□-□□, AND THE REPLACEMENT PART NUMBER.**

IF THE MONITOR HAS BEEN MODIFIED, SPECIFY THE MODIFICATION NUMBER ON THE PARTS ORDER. CUSTOMER MUST SET PROGRAMMABLE OPTIONS – MONITOR SHIPPED AS SHOWN IN SECTION 4 OF THIS MANUAL. IF IN DOUBT ABOUT THE PART NUMBER, CALL YOUR BENTLY NEVADA CORPORATION REPRESENTATIVE BEFORE ORDERING.



MONITOR IDENTIFICATION LABEL

33 SPECIFICATIONS

INPUT

Signal Input	Two channels, proximity input, 10kΩ input impedance
Signal Scale Factor	200mV/mil (8v/mm)

SIGNAL CONDITIONING

Monitor Range	Full scale meter range selected per Option Table.
Frequency Response	240 to 240,000 rpm and 60 to 36,000 rpm
Accuracy	±0.33% of full scale error typical at 77°F (25°C) ±1% of full scale error maximum at 77°F (25°C) ±2% of full scale error maximum at 77°F (25°C) with 2x trip multiply option selected ±3% of full scale error maximum at 77°F (25°C) with 3x trip multiply option selected

ALARMS

Alarm Set Points	Alert/Danger alarm levels (adjustable from 0 to 100% of full scale)
Alarm Delay	Alarm delay times are user-programmable per options

DISPLAYS

Meter	LCD bargraph, dual scale with outside scales marked per monitor full scale range and center scale marked for probe gap voltage at 1.6% resolution.
LEDs	Green LEDs annunciate transducer OK condition, red LEDs annunciate DANGER, ALERT, and BYPASS conditions.

CONTROLS

Front Panel	Front panel switches (3) for reading ALERT and DANGER setpoint levels, and for reading probe Gap voltage
Internal	Switches on circuit board for setpoint adjustment, Danger Bypass, and Channel Bypass
External	External remote controls: Reset, Trip Multiply, Inhibit, and setpoint adjust (↑ and ↓)

OUTPUT

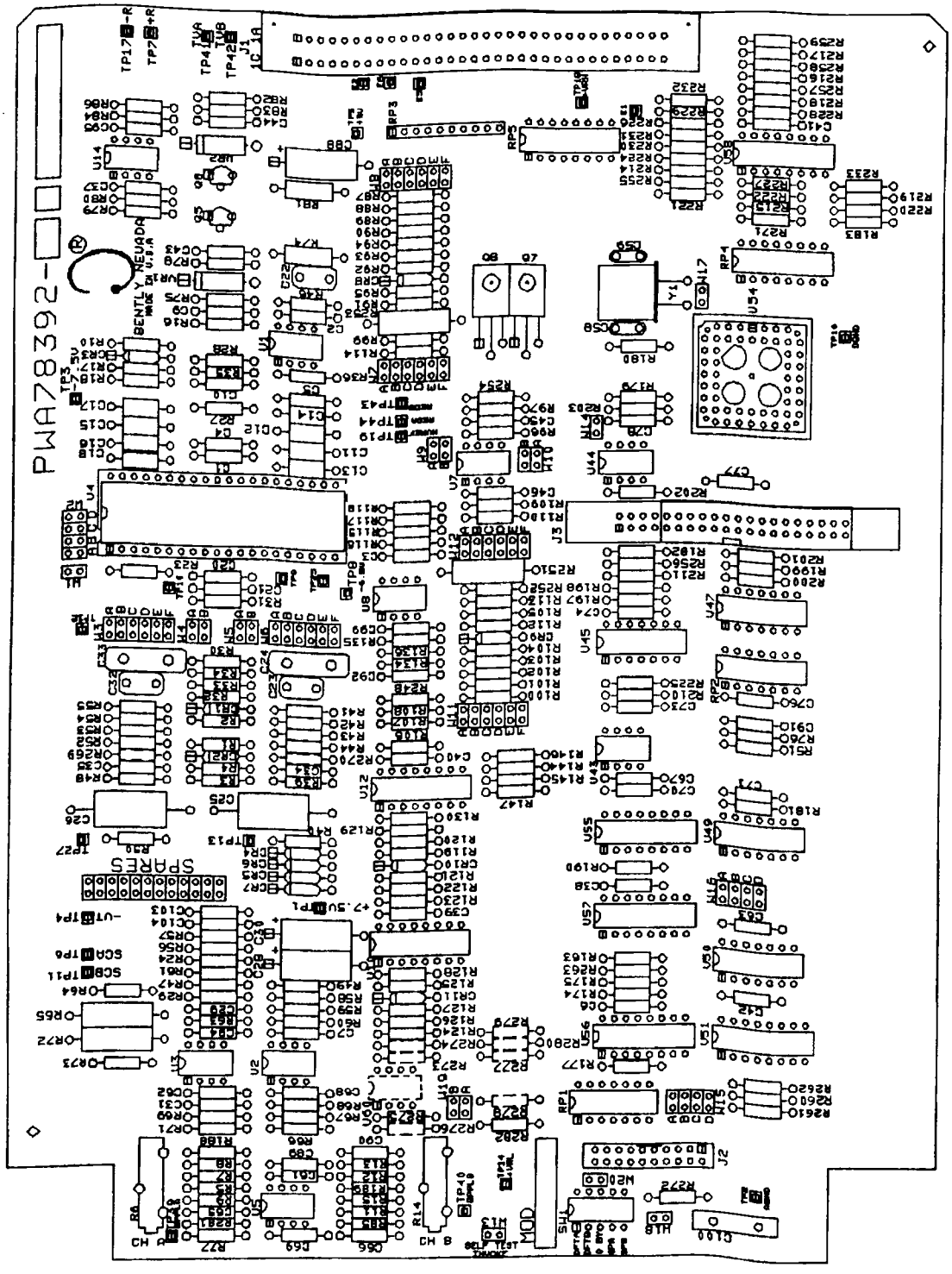
Recorder	Output proportional to selected full scale monitor range and protected against continuous short circuit to ground: +4 to +20mA, 12 V compliance +1 to +5 Vdc, 100-ohm output impedance 0 to -10 Vdc, 100-ohm output impedance
Transducer Power	-24 Vdc or -18 Vdc determined transducer option selected in power supply, short-ciruit protected
Alarms & OK	Relay drives for alarms (ALERT and DANGER) and monitor and transducer OK
Dual Relays	5 Amps @120 Vac 50/60 Hz 5 Amps 28 Vdc
Quad Relays	0.6 Amp @120 Vac 50/60 Hz 2 Amps 30 Vdc

ENVIRONMENTAL

Temperature	Operating: +32°F to 149°F (0°C to 65°C) Storage: -40°F to +185°F (-40°C to +85°C)
Humidity	0 to 95%, noncondensing

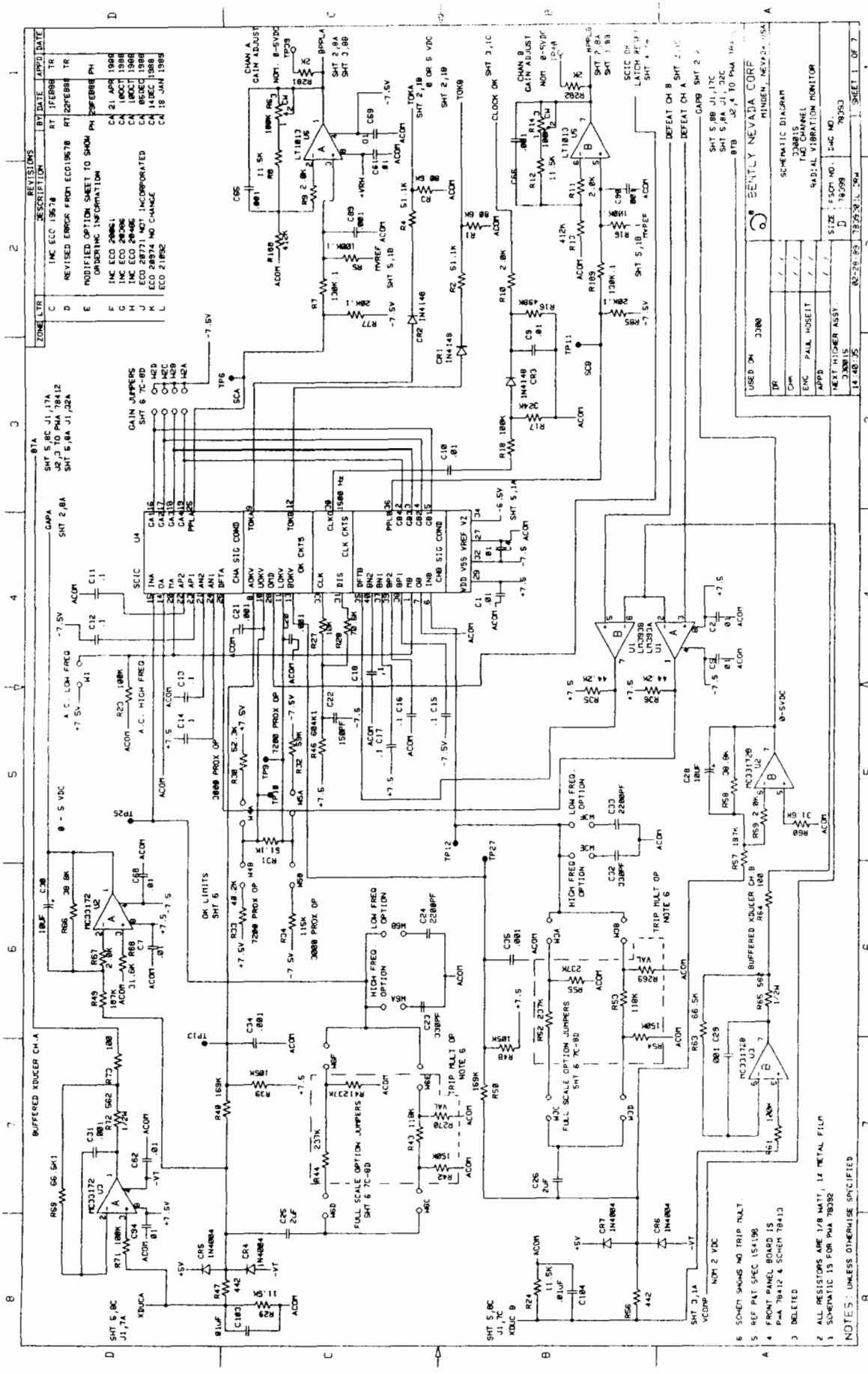
34 SCHEMATICS & PWA DRAWINGS

DRAWING TITLE	DRAWING NO.	NO. OF SHEETS
PWA		
DUAL RADIAL VIBRATION MONITOR	78392	SHEET 1 OF 1
3300/15 SIGNAL NAMES		SHEET 1 OF 1
SCHEMATIC DIAGRAM		
DUAL RADIAL VIBRATION MONITOR	78393	SHEETS 7 OF 7
SCHEMATIC DIAGRAM		
DUAL RADIAL VIBRATION FRONT PANEL	78413	SHEET 1 OF 1
ASSEMBLY		
SIRM EPOXY	78462	SHEETS 3 OF 3
SCHEMATIC DIAGRAM		
SIRM EPOXY	78463	SHEETS 2 OF 2
SCHEMATIC DIAGRAM		
QUAD RELAY	83730	SHEETS 2 OF 2



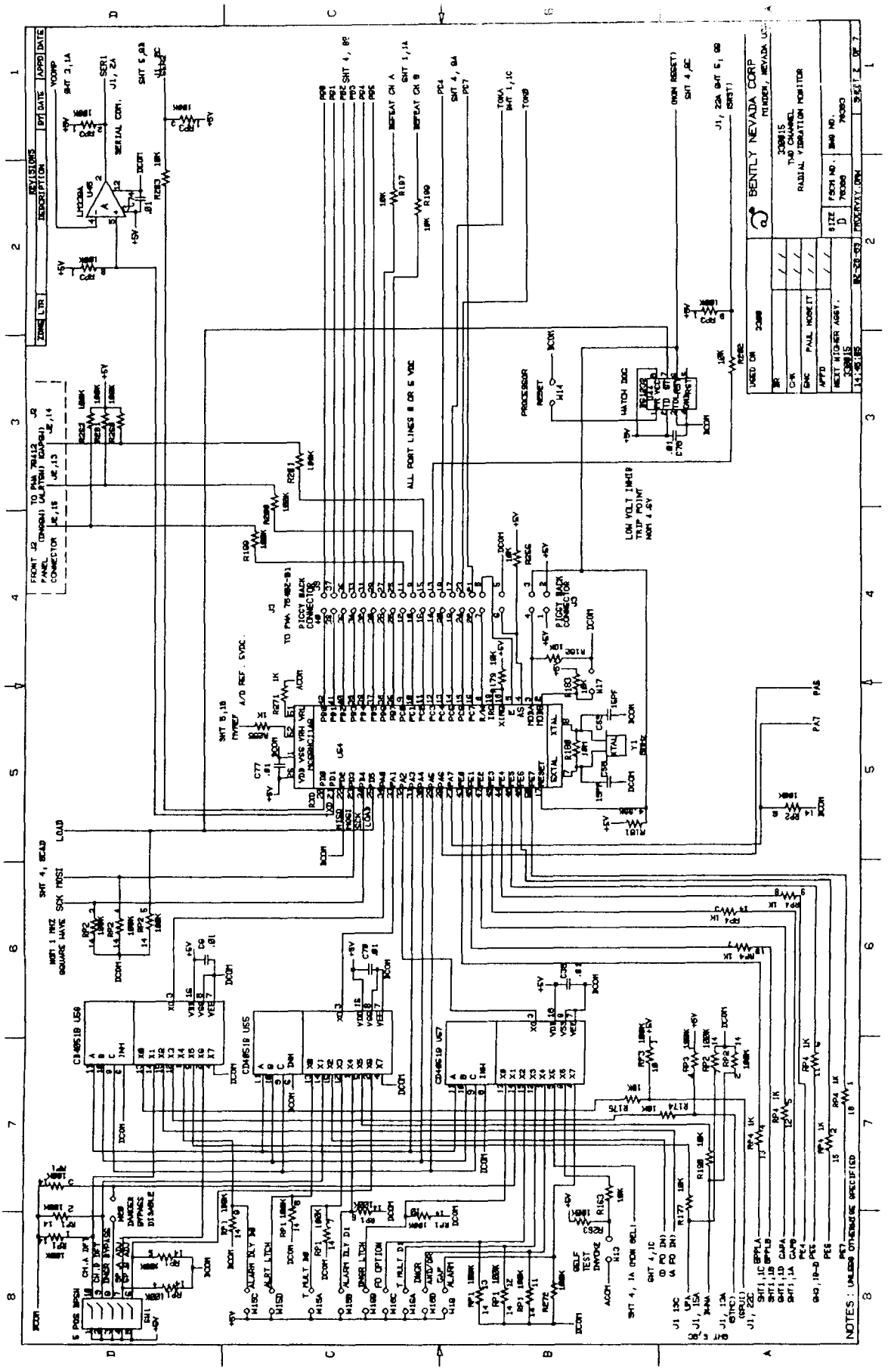
PRINTED WIRING ASSEMBLY
DUAL RADIAL VIBRATION MONITOR

78392
SHEET 1 OF 1



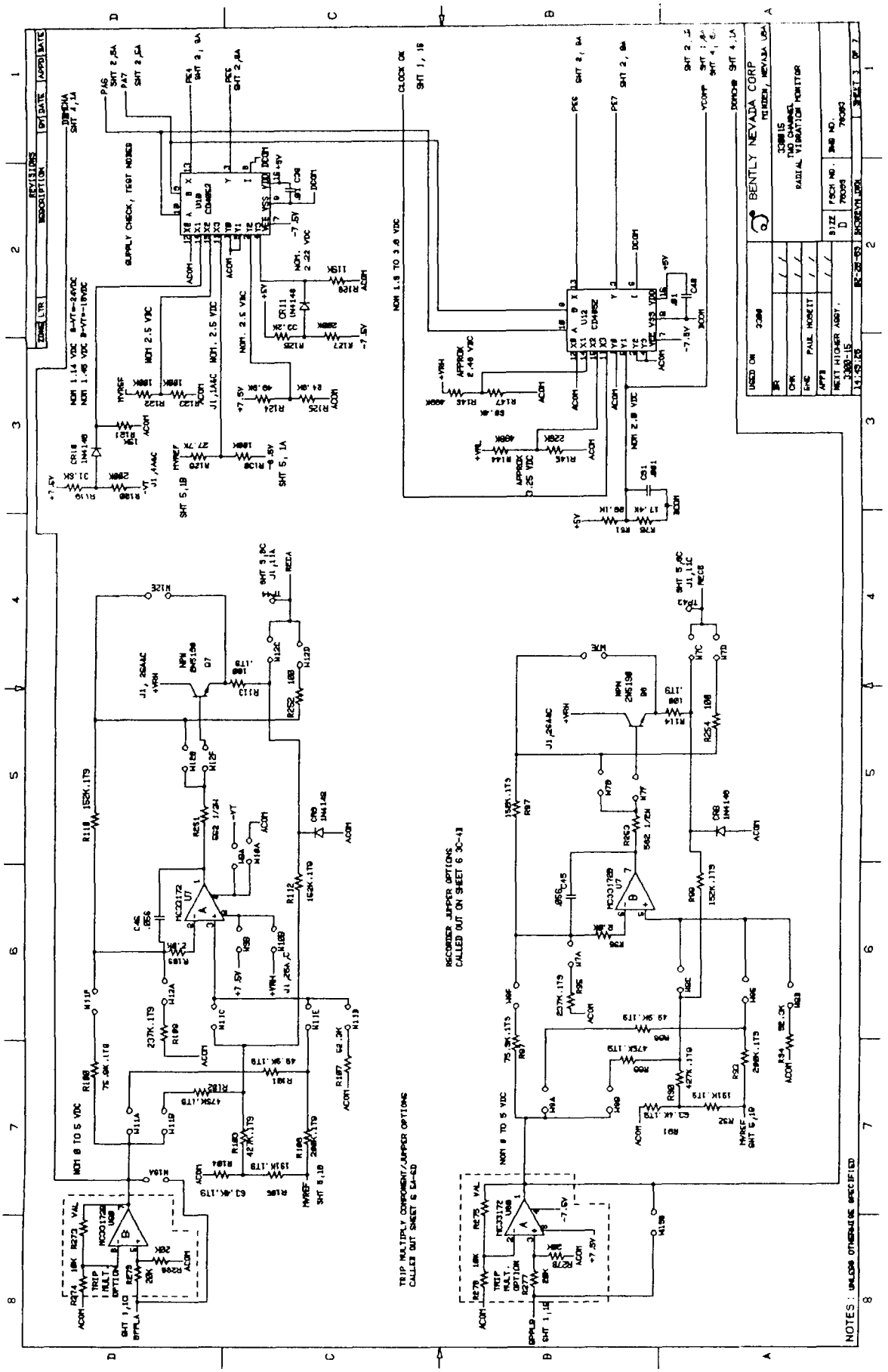
SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 1 OF 7



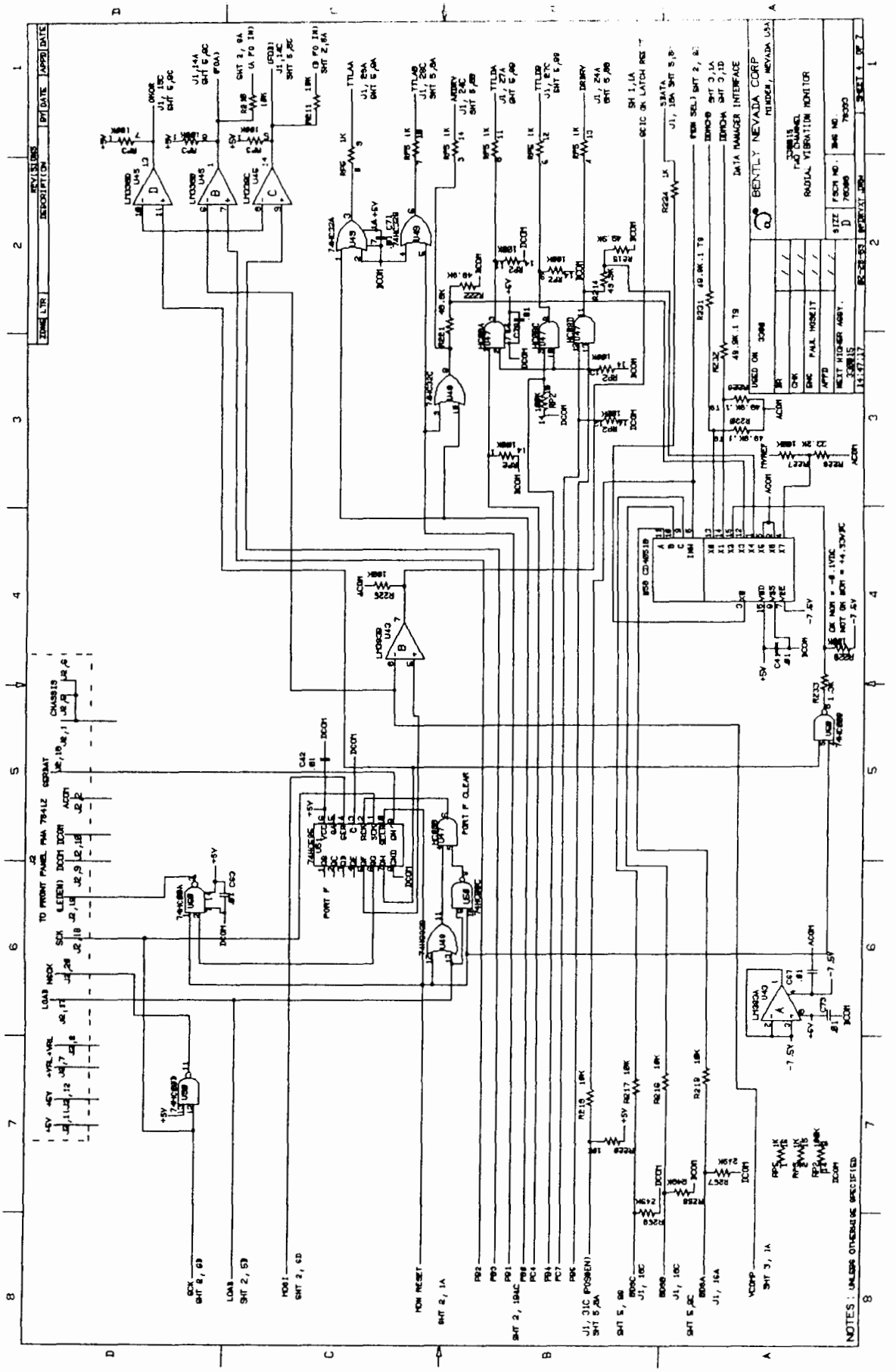
SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 2 OF 7



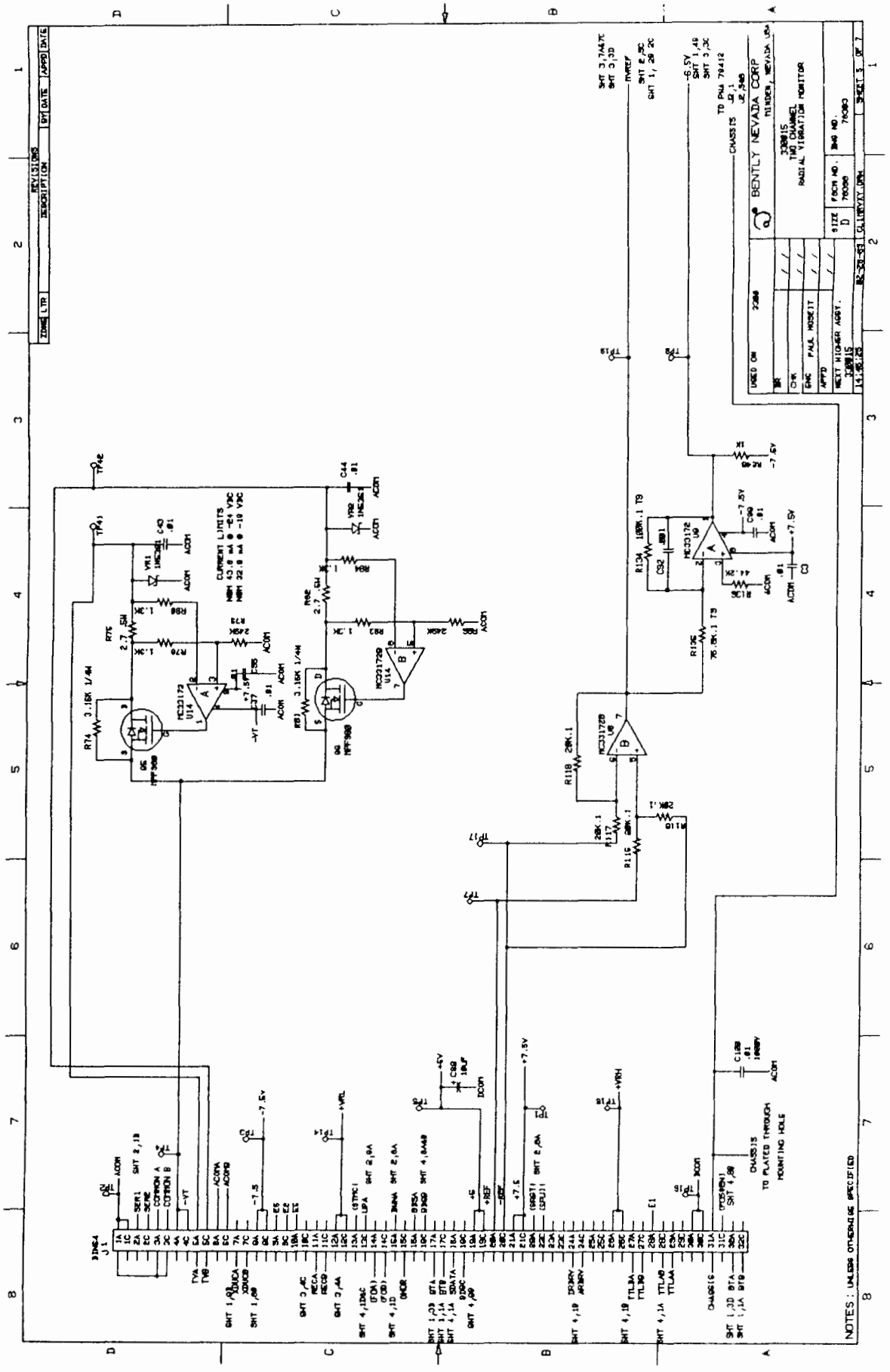
SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 3 OF 7



SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 4 OF 7



SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 5 OF 7

SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR
78393
SHEET 6 OF 7

PROGRAMMABLE OPTIONS

3300/15 — [A A] [B B] [C C] [D D] [E E] [F F]

OPT	MONITOR FULL SCALE OPTION	JUMPER
01	0 - 3 MILS	W3B,W3D,W3E,W4E W2A,W2C
02	0 - 5 MILS	W3D,W3B,W3C,W4E W2A
03	0 - 10 MILS	W4D,W4F,W3C,W3A W2A
04	0 - 15 MILS	W4D,W4F,W3C,W3A W2B,W2C,W2D
05	0 - 20 MILS	W4D,W4F,W3C,W3A W2B,W2D
11	0 - 100 um	W3D,W3B,W3C,W4E W2A,W2D
12	0 - 150 um	W4D,W4F,W3C,W3A W2A,W2C
13	0 - 200 um	W4D,W4F,W3C,W3A W2A,W2D
14	0 - 400 um	W4D,W4F,W3C,W3A W2B,W2C
15	0 - 500 um	W4D,W4F,W3C,W3A W2B,W2D

OPT	TRANSDUCER INPUT	JUMPER
01	7200 PROX OPTION	W4B,W5A
02	3000 PROX OPTION	W4A,W5B

OPT	ALARM RELAYS
00	NONE
01	6 AMP. EPOXY RELAYS
02	5 AMP. HERMETIC RELAYS

OPT	APPROVALS
00	NONE
01	CSA
02	BASEEFA
03	CITY OF L.A.

OPT	BARRIERS
00	NONE
01	EXTERNAL

OPT	TRIP MULTIPLY	JUMPERS
00	NONE	W19A,W19B
01	2X TRIP MULT.	W15A &1
02	3X TRIP MULT.	W16A &1

NOTE: BEFORE CONFIGURING A FULL SCALE RANGE REMOVE JUMPERS W2A-D,W3A-3D & W6C-6F THEN INSTALL THE APPROPRIATE JUMPERS

MONITOR OPTIONS

DANGER BYPASS ENABLE	INSTALL JUMPER W20
DANGER BYPASS DISABLE	REMOVE JUMPER W20
"DANGER AND"	INSTALL JUMPER W16D
"DANGER OR"	REMOVE JUMPER W16D
FIRST OUT	INSTALL JUMPER W16C
NO FIRST OUT	REMOVE JUMPER W16C
LATCHING ALERT ALARMS	INSTALL JUMPER W15D
NON-LATCHING ALERT ALARMS	REMOVE JUMPER W15D
LATCHING DANGER ALARMS	INSTALL JUMPER W16B
NON-LATCHING DANGER ALARMS	REMOVE JUMPER W16B
0.1 SEC ALARM DELAY	REMOVE JUMPERS W15C,W15B
1.0 SEC ALARM DELAY	INSTALL JUMPER W15C REMOVE JUMPER W15B
3.0 SEC ALARM DELAY	INSTALL JUMPER W15B REMOVE JUMPER W15C
6.0 SEC ALARM DELAY	INSTALL JUMPERS W15B,W15C

MONITOR RECORDER OPTIONS

+4 TO +20 mA	INSTALL JUMPERS W11B,W11C,W12A,W12C,W12E,W12F W10B,W10A,W8B,W8C,W7A,W7F,W7C,W7E REMOVE JUMPERS W11F,W11A,W11E,W11D,W12B,W9B W9A,W12D,W8F,W8A,W8E,W8D,W7B,W7D
+1 TO +5 V	INSTALL JUMPERS W11A,W11E,W10B,W10A,W12B,W12D W8A,W8E,W7B,W7D REMOVE JUMPERS W11F,W12F,W11D,W11C,W11B,W9B,W9A W12E,W8F,W9B,W7E,W7F,W9C,W7C,W12C,W8B,W7A,W12A
0 TO -10V	INSTALL JUMPERS W11F,W11D,W12B,W12D,W9B,W9A W8F,W8D,W7B,W7D REMOVE JUMPERS W11A,W11B,W11C,W12A,W11E,W10B,W10A,W12F W12E,W12C,W8A,W8B,W8C,W8E,W7A,W7F,W7E,W7C

INDEX OF TERMINOLOGY

SIGNAL	COMPLETE SIGNAL NAME
ACOM	ANALOG COMMON
DCOM	DIGITAL COMMON
+5V	5 VOLT DIGITAL SUPPLY
+7.5V	ANALOG SUPPLY +7.5V
-7.5V	ANALOG SUPPLY -7.5V
-VT	TRANSDUCER/ANALOG SUPPLY -24V OR -18V
+VRL	LOW ROUGH SUPPLY VOLTAGE
+VRH	HIGH ROUGH SUPPLY VOLTAGE
XDUCA	TRANSDUCER SIGNAL CHANNEL A
XDUCB	TRANSDUCER SIGNAL CHANNEL B
VCOMP	COMPARATOR THRESHOLD VOLTAGE (+2 VOLTS)
BTA	BUFFERED TRANSDUCER SIGNAL CHANNEL A
BTB	BUFFERED TRANSDUCER SIGNAL CHANNEL B
CAPA	TRANDUCER CAP SIGNAL CHAN. A
CAPB	TRANSDUCER CAP SIGNAL CHAN. B
BPPLA	BUFFERED PEAK TO PEAK PROPORTIONAL CHAN A
BPPLB	BUFFERED PEAK TO PEAK PROPORTIONAL CHAN.B
DEFEAT CH A	CHANNEL A DEFEAT
DEFEAT CH B	CHANNEL B DEFEAT
SCIC OK LATCH RESET	SCIC OK LATCH RESET
TOKA	TRANSDUCER OK CHANNEL A
TOKB	TRANSDUCER OK CHANNEL B
CLOCK OK	SCIC CLOCK SIGNAL CHECK
MVREF	+5V VOLTAGE REFERENCE
-6.5V	-6.5V VOLTAGE REFERENCE
(DNGSW)	DANGER SWITCH
(ALRTSW)	ALERT SWITCH
(CAPSW)	CAP SWITCH
PB0 - PB7	PORT B0 - PORT B7
PC4 & PC7	PORT C4 & PORT C7
MON RESET	MONITOR RESET
(SRST)	SYSTEM RESET
PA6 & PA7	PORT A6 & PORT A7
PE4 - PE7	PORT E4 - PORT E7
(SPUI)	SYSTEM POWER UP INHIBIT
(STMC)	SYSTEM TRIP MULTIPLY
UPA	UP ARROW
DWNA	DOWN ARROW

MONITOR FREQUENCY OPTIONS

36,000 RPM CORNER FREQUENCY OPTION	JUMPERS W1,W6B,W3F REMOVE W6A,W3E
240,000 RPM CORNER FREQUENCY OPTION	JUMPERS W6A,W3E REMOVE W1,W6B,W3F

MONITOR PROCESSOR OPTIONS

INVOKE SELF TEST	MOMENTARY SHORT W13
PROCESSOR RESET	MOMENTARY SHORT W14
SINGLE CHIP MODE	JUMPER PINS 9-40 OF J3
EXPANDED MODE	PLUG PIGGY BOARD PWA 78402-01 INTO J3

NOTE: () DENOTES ACTIVE LOW

&' TRIP MULTIPLY COMPONENT OPTIONS

2X TRIP MULTIPLY	U68: MC33172 R277-R280 : 20K R274,R276 : 10K R273,R275 : 30.1K R44,R52 : 475K R41,R55 : 156K R43,R53 : 237K R269,R270 : 237K REMOVE R42,R54
3X TRIP MULTIPLY	U68 : MC33172 R277-280 : 20K R274,R276 : 10K R273,R275 : 49.9K R44,R52 : 681K R41,R55 : 137K R43,R53 : 357K R 269,R270 : 180K REMOVE R42,R54

INDEX OF TERMINOLOGY

SIGNAL	COMPLETE SIGNAL NAME
SCK	SERIAL CLOCK
MOSI	MASTER OUT SLAVE IN
LOAD NSCK	SHIFT REGISTER LATCHES LOAD INVERTED SERIAL CLOCK
SER1	SERIAL COMMUNICATIONS TRANSMIT
SER2	SERIAL COMMUNICATIONS RECEIVE
RECA	RECORDER CHANNEL A
RECB	RECORDER CHANNEL B
DDMCHA	DDM STATIC DATA CHAN.A
DDMCHB	DDM STATIC DATA CHAN.B
(POS#EN)	RACK SLOT POSITION ENABLE
(MON SEL)	MONITOR SELECT
BDSC	BUFFERED DDM STATIC DATA SELECT LINE C
BDSB	BUFFERED DDM STATIC DATA SELECT LINE B
BDSA	BUFFERED DDM STATIC DATA SELECT LINE A
(LEDEN)	LED DRIVER ENABLE
SERDAT	SERIAL DATA
CHASSIS	CHASSIS COMMON
(OKOR)	MONITOR OK BUS DRIVER
(FOA)	ALERT FIRST OUT DRIVER
(FOD)	DANGER FIRST OUT DRIVER
(A FO IN)	ALERT FIRST OUT INPUT
(D FO IN)	DANGER FIRST OUT INPUT
TTLAA	TTL ALERT DRIVE CHANNEL A
TTLAB	TTL ALERT DRIVE CHANNEL B
TTLDA	TTL DANGER DRIVE CHANNEL A
TTLDB	TTL DANGER DRIVE CHANNEL B
ARDRV	ALERT RELAY DRIVE
DRDRV	DANGER RELAY DRIVE
SDATA	DDM STATIC DATA
+REF	+5V REFERENCE SOURCE
-REF	+5V REFERENCE RETURN
ACOMA	TRANSDUCER COMMON CHAN. A
ACOMB	TRANSDUCER COMMON CHAN.B

REVISIONS

ZONE	LTR	DESCRIPTION	BY	DATE	APPD	DATE

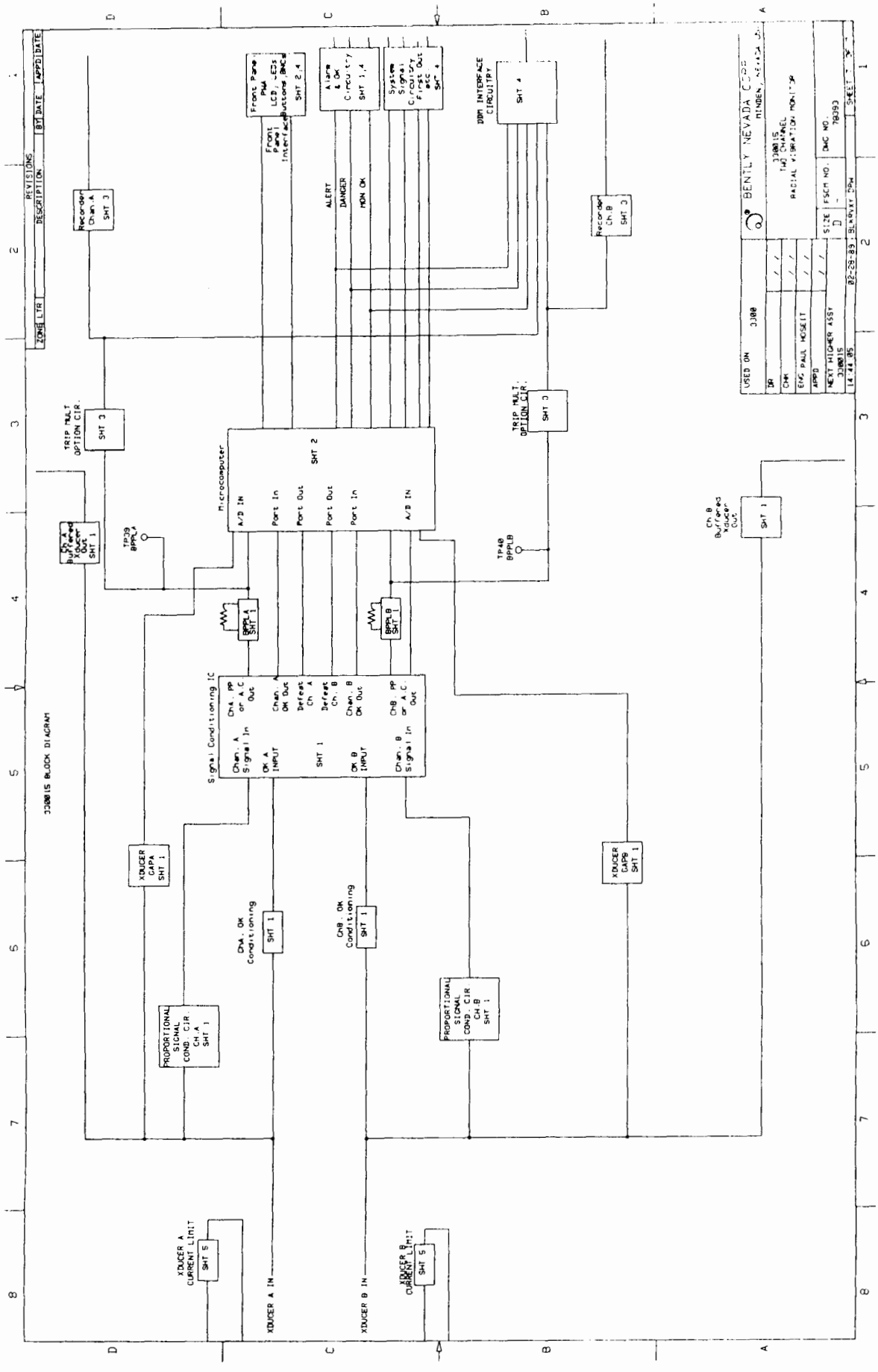
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DR	/ /
CHK	/ /
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APPD	/ /
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BENTLY NEVADA CORP
MINDEN, NEVADA USA

330015
2 CHANNEL
RADIAL VIBRATION MONITOR

SIZE	FSCM NO.	DWG NO.
D	78399	78393

OPRVXY.DRW SHEET 6 OF 7



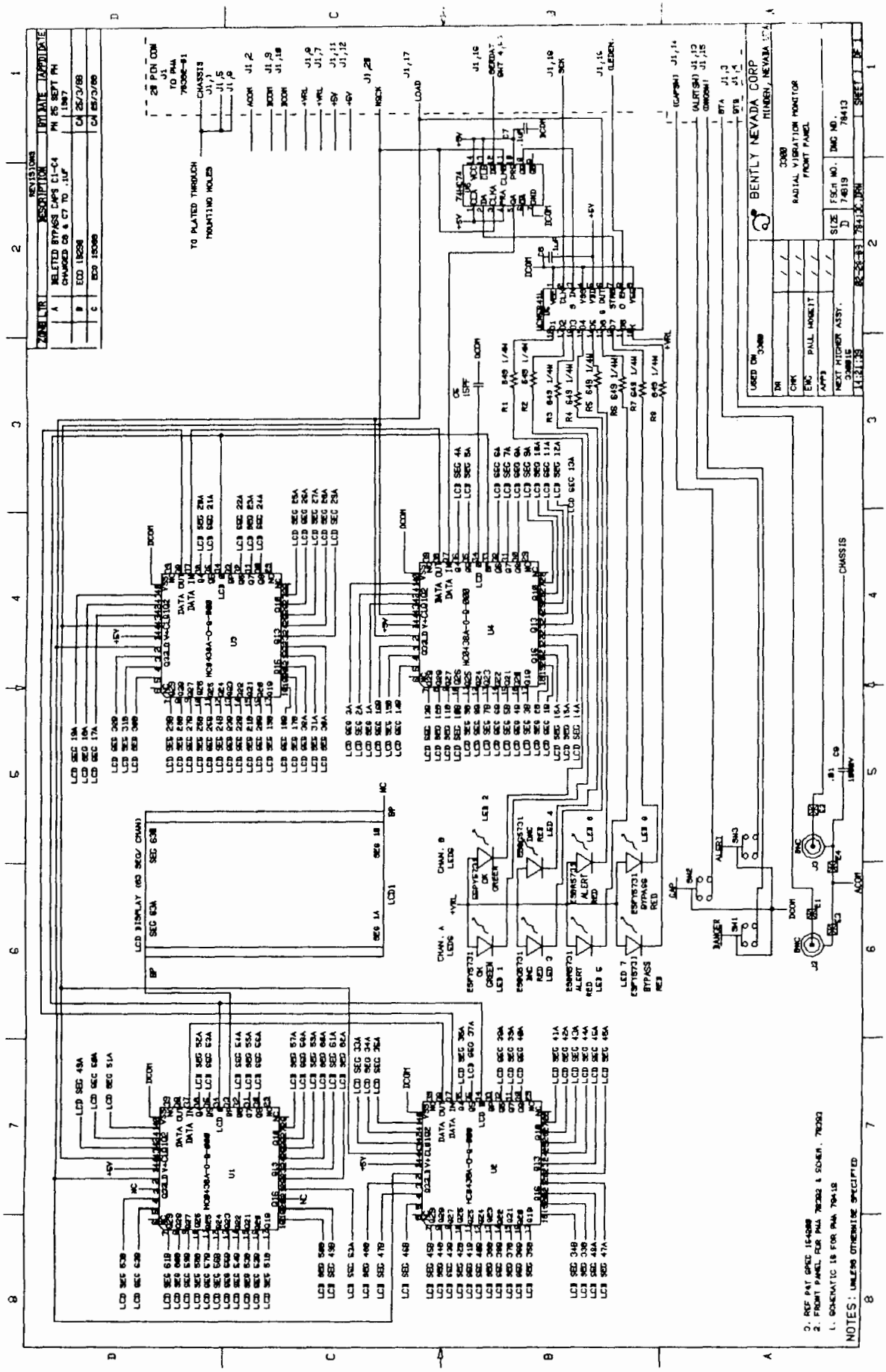
SCHEMATIC DIAGRAM
DUAL RADIAL VIBRATION MONITOR

78393
SHEET 7 OF 7

3300/15 SCHEMATIC SIGNAL NAMES
ABBREVIATIONS OF THE SIGNALS USED IN THE SCHEMATIC

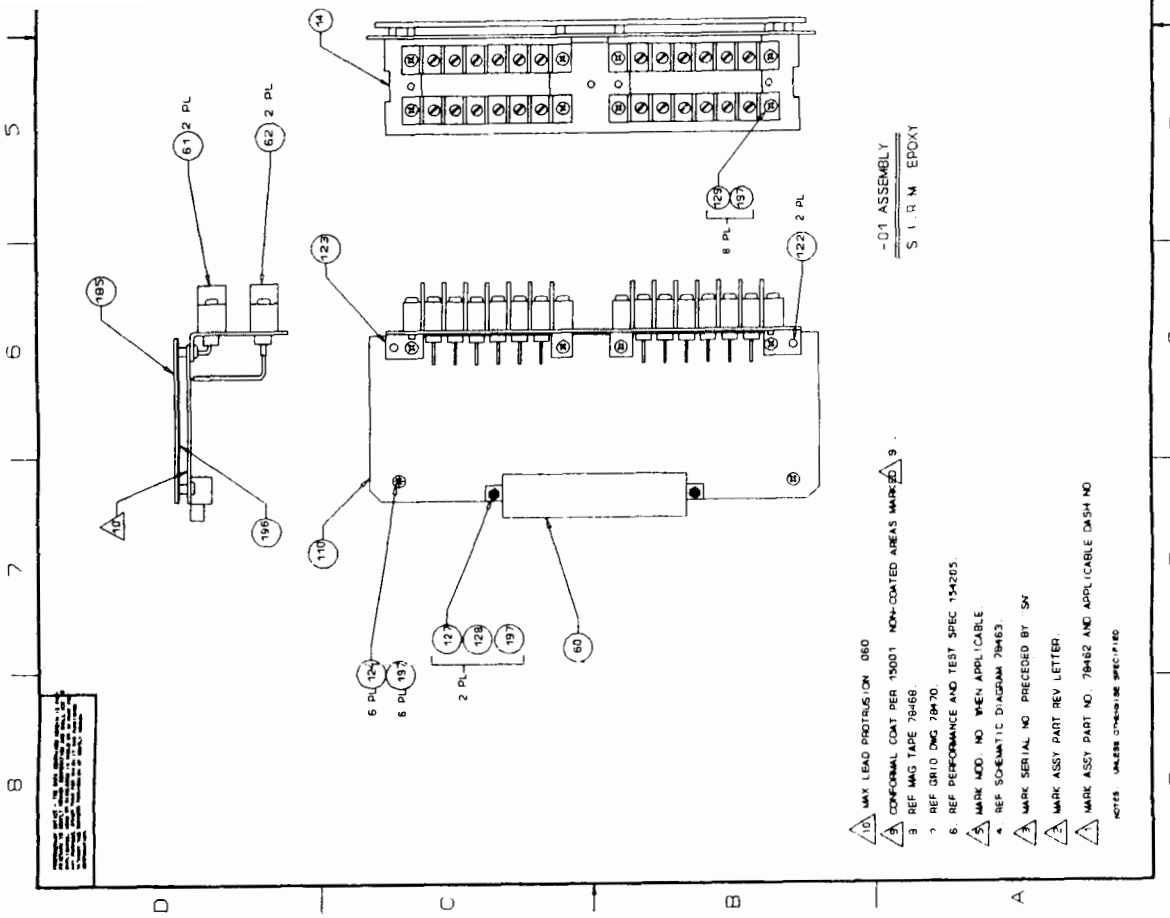
SIGNALS ON THE SCHEMATIC	COMPLETE SIGNAL NAME
ACOM	ANALOG COMMON
ACOMA	TRANSDUCER COMMON CHANNEL A
ACOMB	TRANSDUCER COMMON CHANNEL B
ALM DLY D0	ALARM DELAY DIGIT 0
ALM DLY D1	ALARM DELAY DIGIT 1
ALR LCH	ALERT LATCHING
ARDRV	ALERT RELAY DRIVE
(A FO IN)	ALERT FIRST OUT INPUT
(ALRSW)	ALERT SWITCH
BDSA	BUFFERED DDM STATIC DATA SELECT LINE A
BDSB	BUFFERED DDM STATIC DATA SELECT LINE B
BDSC	BUFFERED DDM STATIC DATA SELECT LINE C
BPPLA	BUFFERED PROPORTIONAL CHANNEL A
BPPLB	BUFFERED PROPORTIONAL CHANNEL B
BTA	BUFFERED TRANSDUCER SIGNAL CHANNEL A
BTB	BUFFERED TRANSDUCER SIGNAL CHANNEL B
BYPASS CH A OR BYP CHA	CHANNEL A BYPASS
BYPASS CH B OR BYP CHB	CHANNEL B BYPASS
CH A BYPASS OR CHA BYP	CHANNEL A BYPASS
CH B BYPASS OR CHB BYP	CHANNEL B BYPASS
CHASSIS	CHASSIS COMMON
COMMONA	TRANSDUCER COMMON CHANNEL A
COMMONB	TRANSDUCER COMMON CHANNEL B
DCOM	DIGITAL COMMON
DNG AND/OR	DANGER AND/OR OPTION
DNG BYPASS OR DNG BYP	DANGER BYPASS
DNG BYP BYP	DANGER BYPASS BYPASS
DNG LCH	DANGER LATCHING
(DNGSW)	DANGER SWITCH
DRDRV	DANGER RELAY DRIVE
DMNA	DANGER ARROW
(D FO IN)	DANGER FIRST OUT INPUT
(FOA)	ALERT FIRST OUT DRIVE
(FOD)	DANGER FIRST OUT DRIVE
FO OPTION	FIRST OUT OPTION
GAPA	TRANSDUCER GAP SIGNAL CHANNEL A
GAPB	TRANSDUCER GAP SIGNAL CHANNEL B
(GAPSW)	GAP SWITCH
LOAD	SHIFT REGISTER LATCHES LOAD COMMAND
(LEDEN)	LED DRIVE ENABLE
OVER/UND	OVER/UNDER SETPOINT ADJUSTMENT
(NORMAL COUNTER)	SELECTION
(MON RESET)	MONITOR RESET
(MON SEL)	MONITOR SELECT
MOSI	MASTER OUT/SLAVE IN

SIGNALS ON THE SCHEMATIC	COMPLETE SIGNAL NAME
MVREF	+5VOLTS VOLTAGE REFERENCE
NSCK	INVERTED SERIAL CLOCK
OKOR	MONITOR OK BUS DRIVE
(POSWEN)	RACK SLOT POSITION ENABLE
RECA	RECORDER CHANNEL A
RECB	RECORDER CHANNEL B
SPA ADJ	SETPOINT CHANNEL A ADJUSTMENT
SPB ADJ	SETPOINT CHANNEL B ADJUSTMENT
SCIC OK LATCH RESET	SIGNAL CONDITIONING IC OK LATCH RESET COMMAND
SCK	SERIAL CLOCK
SDATA	DDM STATIC DATA
SER1	SERIAL COMMUNICATIONS TRANSMIT
SER2	SERIAL COMMUNICATIONS RECEIVE
(SPUI)	SYSTEM POWER UP INHIBIT
(SRST)	SYSTEM RESET
TOKA	TRANSDUCER OK CHANNEL A
TOKB	TRANSDUCER OK CHANNEL B
TTLAA	TTL ALERT DRIVE CHANNEL A
TTLAB	TTL ALERT DRIVE CHANNEL B
TTLDA	TTL DANGER DRIVE CHANNEL A
TTLDB	TTL DANGER DRIVE CHANNEL B
VCOMP	COMPARATOR THRESHOLD VOLTAGE (+2VOLTS)
UPA	UP ARROW
XDCRA	TRANSDUCER SIGNAL CHANNEL A
XDCRB	TRANSDUCER SIGNAL CHANNEL B
+5V OR +5VDC	+5VOLTS DIGITAL SUPPLY
+7.5V OR +7.5 VDC	+7.5VOLTS ANALOG SUPPLY
+VRH	HIGH ROUGH SUPPLY VOLTAGE
+VRL	LOW ROUGH SUPPLY VOLTAGE
+5 REF	+5VOLTS REFERENCE FROM SYSTEM SUPPLY
+REF	COMMON FOR +REF
-VT OR -Vt	TRANSDUCER/ANALOG SUPPLY
-6.5V OR -6.5VDC	-6.5 VOLTS REFERENCE
-7.5 OR -7.5VDC	-7.5 VOLTS ANALOG SUPPLY
PA_	PORT A_
PB_	PORT B_
PC_	PORT C_
PD_	PORT D_
PE_	PORT E_



SCHEMATIC DIAGRAM
DRV FRONT PANEL

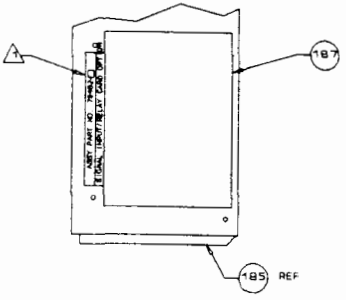
78413
SHEET 1 OF 1



ASSEMBLY
S I R M EPOXY/ S I M

78462
SHEET 1 OF 3

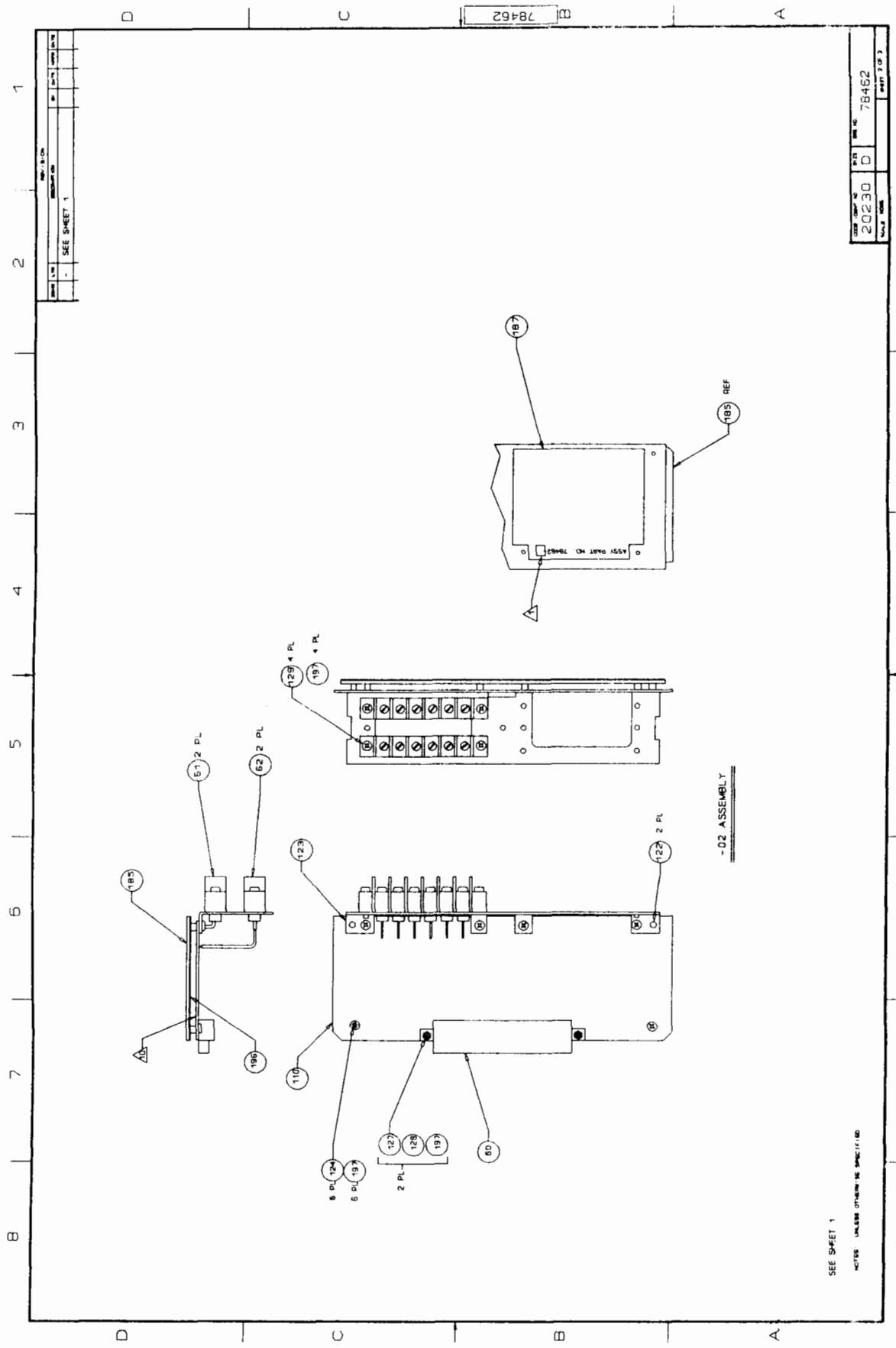
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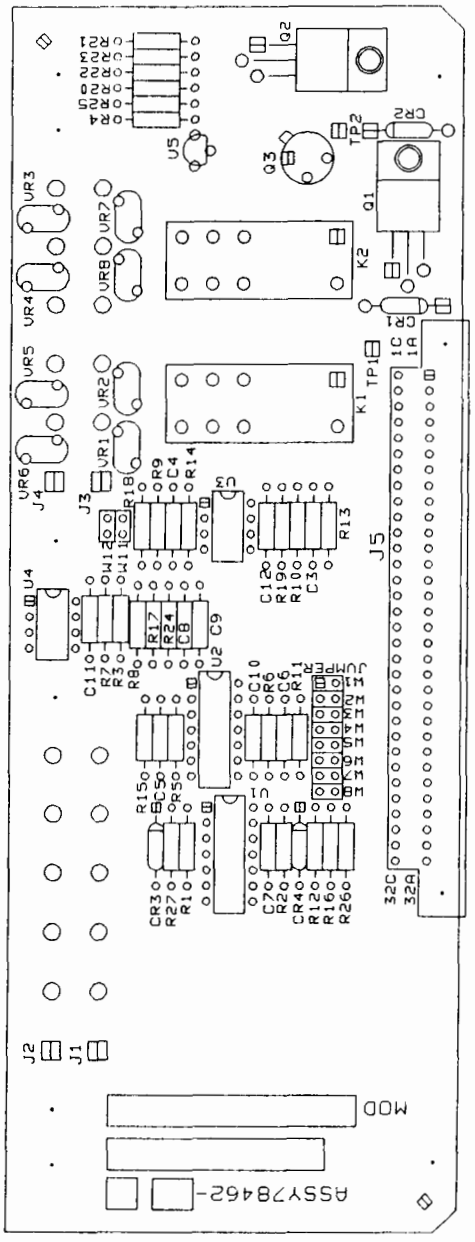
UNLESS OTHERWISE SPECIFIED	BENTLY NEVADA	A
	ASSEMBLY S I R M , EPOXY/ S I M	
DRAWN B.R.J. DATE 8AUG97	CODE IDENT NO 20230	SIZE D
CHECK B.R.J. 14SEP97	DWG NO 78462	
ENGR J. RODRIGUEZ 14SEP97	SCALE NONE	SHEET 1 OF 3

78462



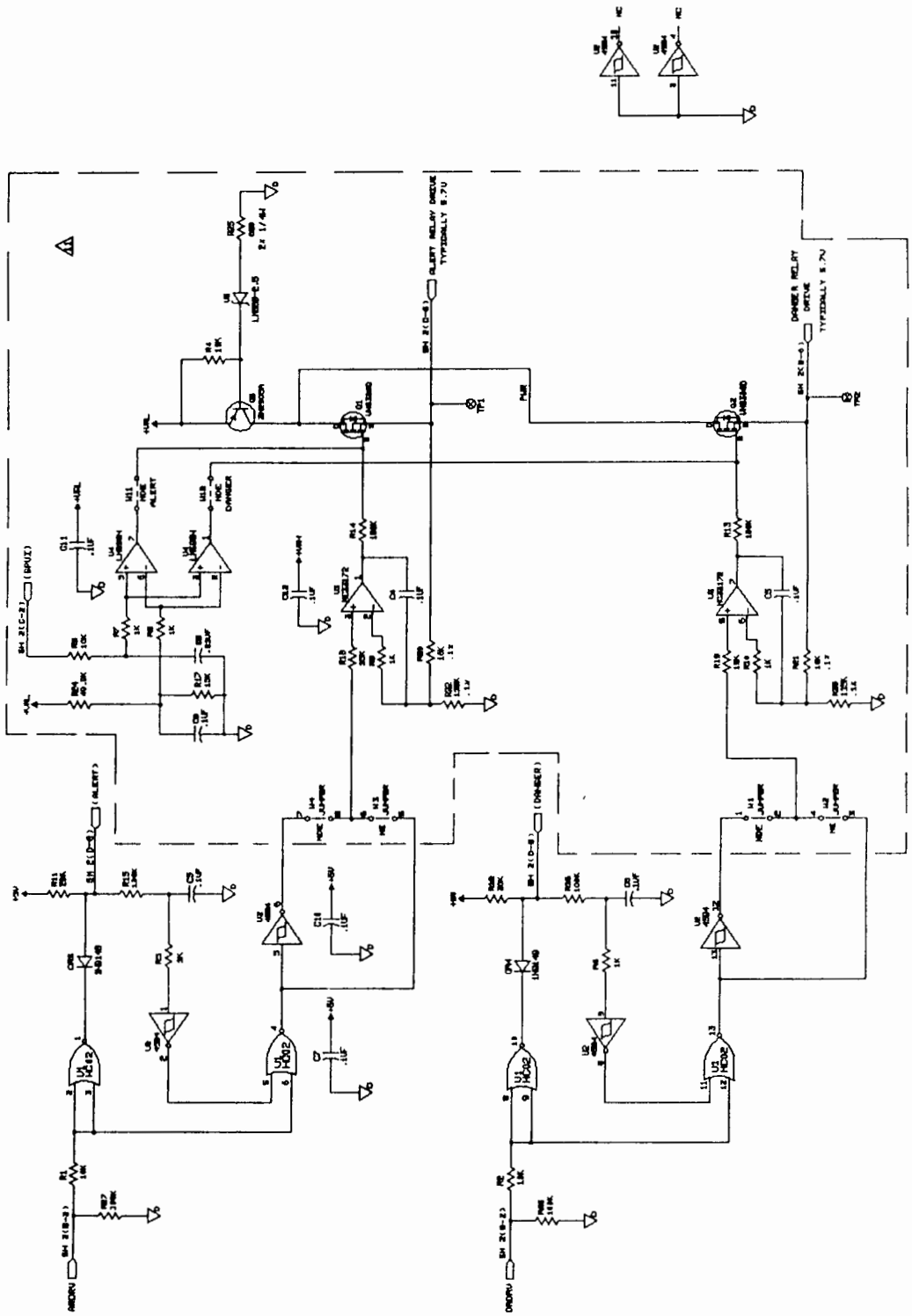
ASSEMBLY
S I R M EPOXY/ S I M

78462
SHEET 2 OF 3



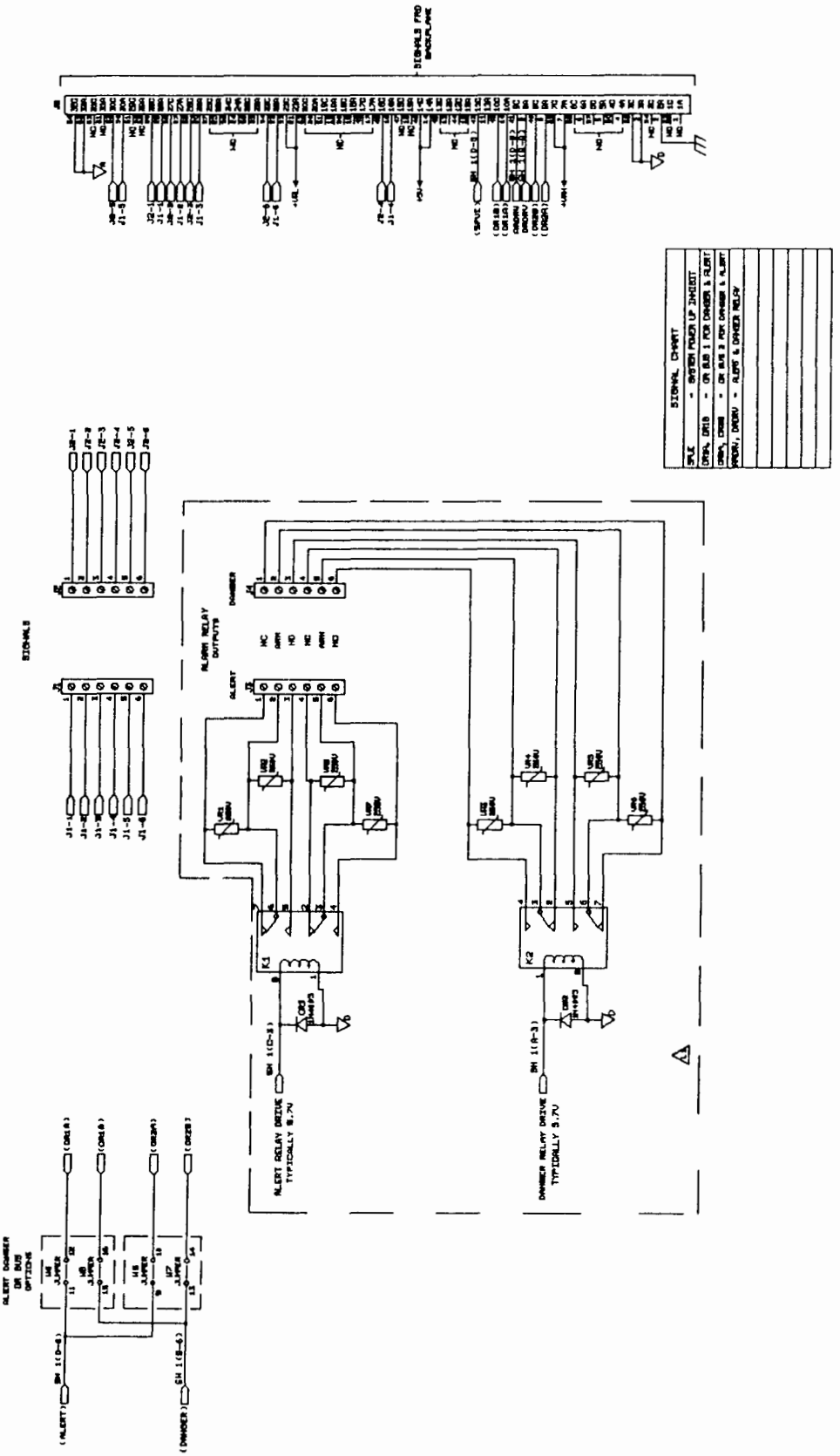
ASSEMBLY
S I R M EPOXY/ S I M

78462
SHEET 3 OF 3



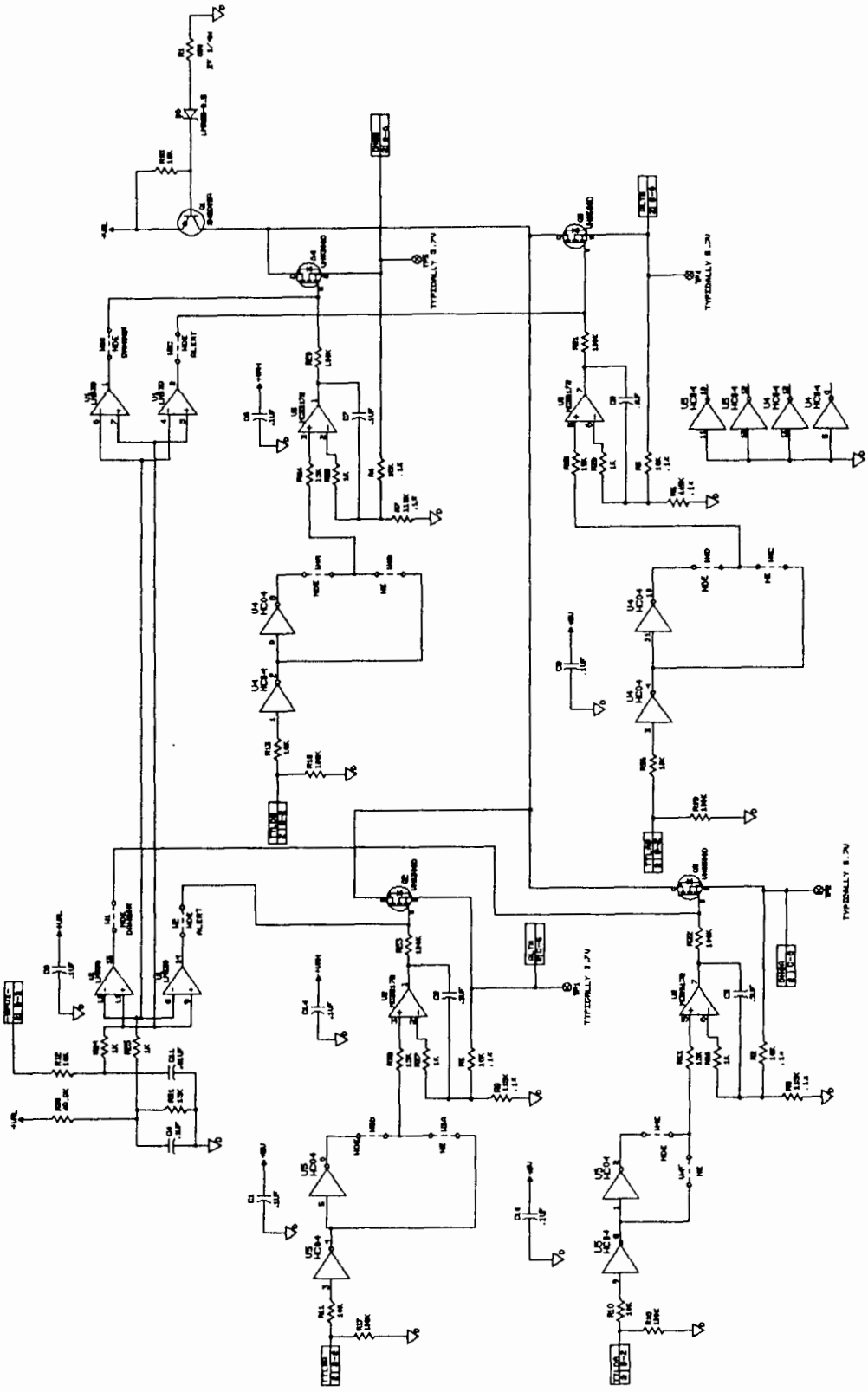
SCHEMATIC DIAGRAM
SIRM EPOXY

78463
SHEET 1 OF 2



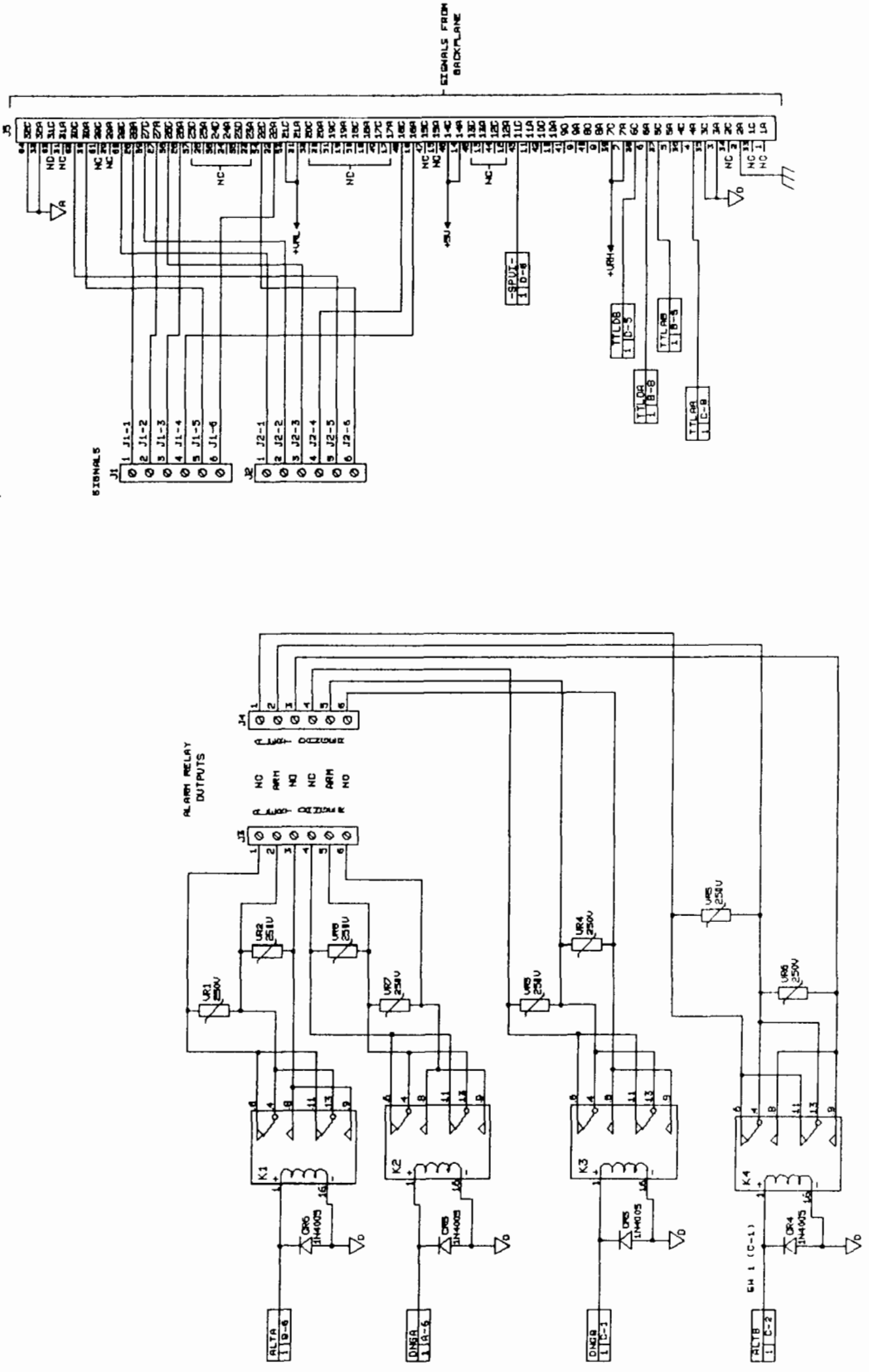
SCHEMATIC DIAGRAM
SIRM EPOXY

78463
SHEET 2 OF 2



SCHEMATIC DIAGRAM
QUAD RELAY

83730
SHEET 1 OF 2



SCHEMATIC DIAGRAM
QUAD RELAY

83730
SHEET 2 OF 2

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